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The Bureau assumes no responsibility with regard to the opinions and the results of experiments outlined in the Bulletin.

The Editor's notes are marked (Ed.).

FIRST PART.
ORIGINAL ARTICLES

The Present Condition of Citrus Growing in Spain

by

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According to the latest official figures, which are fairly accurate, there are in Spain 117 459 acres under oranges and 6363 acres under lemons. Other citrus fruits are not grown to any extent, and probably 100 000 acres would cover the area under limes and citrons; further, these are hardly ever grown alone, but are planted in small numbers among lemons and lemons.

The production of fruit in 1910 was 782 200 English tons of oranges and 623 250 tons of lemons.

THE CHIEF ORANGE-GROWING REGIONS OF SPAIN.

The principal orange-producing centres in Spain are the renowned provinces of Valencia and Castellón, the province of Murcia and the province of Seville: these represent three distinct regions.

In the *first* region sweet oranges, particularly Valentian, Imperial, and Tangerines, are almost exclusively grown: these are in demand in the English market and for consumption in Madrid. There are many other varieties, in particular blood oranges, which are much in demand in Germany owing to their good keeping qualities.

Orange growing has long been carried on in this region along the coast in the lower valleys of the rivers, where frosts are quite exceptional, as now extended up the lower slopes and first plateaus of the neighbouring mountains, but the crop is here not quite certain. The soil in the orange groves on the low ground is clayey in Castellón and lighter in Valencia, but always deep; out of the valleys the cultivable soil is poor and can only support oranges when carefully improved. This region also includes the groves in the provinces of Tarragona and Alicante, which lie on the north and south respectively. Most of the oranges

exported and consumed in the centre and north of Spain are grown in this region. Of the 120 000 acres in Spain, nearly 100 000 belong here and of these some 850 000 are in the two provinces of Valencia and Castellón. The chief centres of production are Alcira and Carcagente in the wide valley of the Júcar, and Burriana and Villareal in the Mijares valley. The sub-region of the Balearic islands may be put with this region, but its production is declining and of little importance.

The density and even distribution of the population and the careful work of the men who attend to the trees and gather the crop are factors no less favourable than the climate to the good results of orange growing.

The principal orange-groves in the *province of Murcia* are about Murcia itself and in the lower valleys of the Segura and the Vinalopó. The meteorological conditions are much the same as in the first region. The soils of the Murcia and Segura valleys are mostly more siliceous, and are very well suited for lemons, largely grown in this region, and limes. These two crops, which cover nearly as large an area as the various varieties of oranges, give sweet and exquisite fruit, which does not keep very well.

The distance from the ports has been the chief reason why these crops have not developed as well as in the Valencia region.

The eastern provinces of Andalusia may be included in this second region, with which indeed they are already connected geographically. Almería and Málaga each grow some 1750 or 2000 acres and Granada about half this area. The valley of the Almanzora and the maritime and central parts of Granada and Málaga are the only areas in which this cultivation leaves the coast and extends to the sheltered slopes of the sierra of the Alpujarra. The soils are formed of transported material and are very fertile owing to the weathering and transportation of the parent Silurian slates.

The commonest varieties are the Chinese orange, the Malta blood orange, the Grano de oro and Tangerines; the fruit is sweet and of good quality. Bitter oranges are also grown in Málaga and limes in Granada and Almería.

A good number of cases of oranges are exported to England from this region. The home market takes the lemons and limes at good prices.

Near the limits of this zone, especially in Granada, orange growing is somewhat neglected, so that the trees often suffer from gummosis. As the dead trees are not replaced, the yield is diminishing; it was, however, never more than sufficient for local needs.

The third comparatively important region is that of *Western Andalusia*, whose centre is the province of Seville with over 3500 acres of groves. Here the climate is less favourable, owing to the cold winters which are general. The chief districts are Seville, Mairena, Carmona and Dos Hermanas. By the valley of the Guadalquivir this important region communicates with the sub-region of Cordova, where it reaches its northern limit on the sheltered slopes of the cordillera of the Morena.

with this region are also connected the groves in the provinces of and Huelva, all on deep and fertile alluvium. The development of oranges in this region is generally greater than in Valencia. Oranges do best, as their flowers can stand cold; on and near the coast they do pretty well, and those from Conil are celebrated. Many varieties, both red and yellow fleshed, grow in the gardens and groves of the ones mentioned.

The cultivation is lucrative here, for the production is somewhat in excess of the consumption and leaves room for export. The oranges picked early are sent away, while those that hang all through the winter are more or less damaged by frost and are sold locally at prices up to 15 cwt. (\$2.20 per 100 lbs.).

Lack of care, particularly as to manuring and pruning, has led to the groves becoming infested with all the diseases which have recently ap-

peared in some of the remaining provinces, such as Barcelona in the north-east, Orense and Cáceres in the south-west and Pontevedra and Compostela in the north-west, oranges are grown on a small scale in sheltered spots or close to the sea.

The cultivation of citrus trees is not everywhere equally careful. In the east coast (Valencia) region may be taken as a model. The clearing of the ground is generally satisfactory, except that trenching is usually carried out before starting a grove: this is due to lack of a mechanical implement for the purpose.

Manuring is copious, but the formulæ used are not always sound. The soil leaves nothing to be desired, as in this region it has long been so.

In this region the picking begins in early November for Imperia's oranges. Some fruits are picked first rather green to relieve the trees and encourage the ripening of the rest; a second picking is carried out in January and February, and the late fruits are picked dead ripe in April. In the province of Valencia there is also a small second crop at the end of summer — the result of a late and more or less irregular flowering.

In the Andalusian region the cultivation is much less careful: the pruning is almost always insufficient, and the neglect of pruning is shown by the angled crowns of the trees. For this reason the trees have suffered from diseases.

A list of pests which infest all our orange-groves with greater intensity is large; the following are the most important: *Chrysomelids*, *dictyospermi* Mask. ("piojo rojo"), *Mytilaspis citricola* Packard ("piojo"), *Dactylopius citri* Risso ("cochinilla algodonosa"), and *hederæ* Vahl ("piojo" or "cochinilla blancos").

The first of these is the most important, owing to its prevalence and the damage it does; the agricultural associations and Government have organized a campaign against this scale: this campaign will be effective as soon as hydrocyanic acid fumigation was taken

up and the worst attacked provinces were provided with the new staff and appliances for the work. The Committee of "ingenieros nomos" to whom the work was entrusted has now 32 tents and a competent staff of trained men.

ECONOMICS OF ORANGE GROWING.

The figures given above for the area and yield of citrus in Spain, which show what great importance these crops now have in the country, have been reached in a short period, for in 1870 the production was only one-third of what it is at present.

The upward movement, which was due to the demand on the European market and the extraordinary development of sea-transport, has been increasing in the last decades of last century. In the east coast, particularly in Valencia and Castellón, the groves increased very rapidly. In Alcira, Játiba, Carcagente, Villareal, Almanzora, Buñol and many other districts they increased four- or five-fold in a few years. Very poor land was brought under cultivation at considerable expense for improvements, including drainage or irrigation. This great expansion slowed down considerably towards the close of the century, partly to economic conditions becoming less and less favourable to superabundant production.

The accompanying table gives the figures for exports for the period 1901-1910.

Year	Quantity exported		Value of exports	
	Oranges	Lemons	Oranges	Lemons
	tons	tons	£*	£*
1901	280 831	3 354	1 698 438	4
1902	362 569	3 189	2 197 617	5
1903	389 324	3 017	2 354 593	3
1904	402 569	4 040	3 353 571	4
1905	308 655	2 437	1 866 706	2
1906	386 505	2 072	2 337 541	2
1907	461 886	2 814	2 793 438	3
1908	458 876	4 088	3 172 090	4
1909	453 888	3 084	2 147 673	3
1910	489 354	3 188	2 367 652	5

* Calculated at 25.20 pesetas to £ 1.

There has been an increase all along, except for irregularities due to on in the crop. So far no serious difficulty in disposing of the product has been experienced.

The value of the exports seems to have changed very little during the decade. If the customs figures are to be credited, there was no great variation from the mean price (5s. 6d. to 6s. per cwt., or \$1.22 to 1.30 per 100 lbs.) except in the years 1904 and 1908, when it was exceeded, and 1909 and 1910, when the price was as low as 4s. 10d. per cwt. (\$1.05 per 100 lbs.). From the above figures the changes in price are not very great, but considering that other reliable figures (1) for 1902 fix the price at 4s. 10½d., it may be taken that the change has not been unfavourable to the production, considering that in the last few years the falling of price has been compensated by the rise in the value of the currency on exchange.

Can these prices be considered paying for the grower?

Sanz Bremon, in his work "Riqueza agricola de la provincia de Valencia," calculates the average yield of an orange grove in full bearing to be 18 000 lbs. per tree and 18 000 lbs. per acre. The annual expenses, including interest on capital and the writing off of the expenses incurred when the trees come into bearing, amount to £15 (\$73) per acre. Taking fruit fallen and consumed at home as one quarter, and reckoning at 5s. 7d. per cwt. (35 cents per 100 lbs.), and accepting the figures given by the Commission on inland customs duties, the annual production can be taken as follows:

18 000 lbs. of oranges at 4s. 10½d. per cwt. (\$1.06 per 100 lbs.) . . .	£29 7s 6d (\$143.10)
18 000 lbs. of oranges at 1s. 7d. per cwt. (35c. per 100 lbs.) . . .	£ 3 3s 3d (\$ 15.75)
Total . . .	£32 11s 2d (\$158.85)

There is thus a net gain of about £17 10s. (\$86) per acre, quite a satisfactory result. In the other orange-producing provinces the conditions are generally no less favourable. While there is no other region in which production is so considerable (the average for the whole of Spain not above 13 500 lbs. per acre) or so valuable, yet elsewhere the cost of production is generally less owing to the lower value of the land and cheaper labour, as in the Andalusian provinces.

The condition of citrus growing would be better if both the yield and the means of disposing of it were always in a normal state. But in complex circumstances, this desirable situation is frequently maintained. At numerous places in the east coast region, particularly in the province of Castellón, the groves have been established on unimproved soil, necessitating heavy expense for its improvement. To ob-

See: *Actas y trabajos de la Comisión extraparlamentaria de consumos*, "Estado 45".
(Author's note).

tain water, for instance, wells had to be bored through rocky beds, such cases the costs of forming the grove entail a much heavier charge on the annual expenses, and the yield generally does not equal that of the valley groves.

In many places, certain factors of more or less constant and general action, such as the steady rise in rents of land and the new diseases, have an unfavourable influence on the economics of production. As long as the disposal of the produce has always been possible, while so far the disposal of the produce has always been possible, it is less easy than formerly, and the characteristic difficulties of a production are beginning to be felt.

The commercial organization, with its sales ill-regulated, its fruits badly distributed and poorly graded, and the frauds of its monopolizers, tends to depreciate the produce and combines with the already existing causes to produce a distinct state of uneasiness, which is considered by some as a veritable crisis in Valencian citrus growing.

It should be remarked that in the other orange-growing districts the conditions of the market continue to be highly favourable; indeed in the east coast region itself, Murcia and Alicante continue to increase the number of their plantations and the size of their export figures, the growers make no such complaints as do those in Valencia and Castellón. It is evident that the over-production is confined to these provinces.

My idea is that the facts just mentioned give evidence of a man-made but not irremediable, crisis. The farmers' association is developing rapidly in the most affected provinces, and the organization of sales and exportation will easily be accomplished by the cooperative societies now in progress of formation, and the Government seems inclined to encourage the movement. The control of orange pests is already effective thanks to the generalization of the hydrocyanic acid method. If these improvements can be further added to by measures for putting an end to the disorder of the new and generally badly situated plantations, orange growing in Spain will recover its former prosperity. Further development of the utilization of the secondary products (orange flow, citric acid, bark), still in its infancy, will furnish a new source of profit which the associations will find it easy to exploit.

It is evident that for this crop, as for all others, the future is uncertain and a constant watch must be kept on competition so as to see how to override it. For many years Spain has had to compete with other European countries. In other parts of the world thousands of acres of oranges and other citrus trees are being planted every year. This future competition (to which indeed all other European crops are subjected) must be provided against by perfecting methods, continually adapting them to local requirements and turning out the type of fruit liked by the consumers.

Calf Rearing on the Emulsion System, with Coconut Butter as Cream Substitute.

by

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at Grabnerhof, Styria, Austria.*

With the rising prices of milk and the better methods of turning the applies to account, it is natural that an attempt should be made -rears to discover effectual substitutes for this substance. Many, most, of these substitutes have proved useless and do not replace at all a satisfactory manner. Although a certain measure of such can be obtained by giving a calf milk only for a short time after its and rearing it subsequently with the assistance of every possible provided the greatest care and a certain amount of money is expended the results are not wholly as satisfactory as if the young animal is supplied for a longer time with milk, even if skim milk is graduated for whole milk. According to this method, a heifer could be given milk for about 5 months, *viz.* whole milk for 2 months, being gradually replaced by skim milk during 2 months, and skim milk fed alone for the last month. In the case of a bull calf, milk is given for 8 months: whole milk for $2\frac{1}{2}$ months, a mixture of whole and skim milk for 4 months and skim milk alone for $1\frac{1}{2}$ month. The guiding principle is never to give the calf a large quantity of milk, but to give it over a considerable period. The expense entailed is not only the result far more satisfactory than if a large quantity is given and soon discontinued. The result of the last-mentioned system is to produce a fat animal at first, *i. e.* one that has a large amount of reserves, which are of little use to a calf. On the contrary, over-feeding is continued throughout most of the rearing period, and the result is a direct decrease in the milk yield. When the milk rations are reduced and the calf is fed on non-fatty substances, it loses the fat it put on and becomes pot-bellied (*Heu-bauch*). The aim of the system of rational feeding is to supply the young beast with such food as will enable it to use all its energy for the purpose of its perfect development; or in other words, the growing power of an animal must be completely brought into play by means of its food, so that its growth gets on its feet.

In 1905, at the Dairy Congress in Paris, the writer became acquainted with the system in vogue in France of replacing milk fat by another

animal fat in calf-rearing and fattening. Encouraged by the success of the method, he made experiments in the same direction. In order to ensure satisfactory results and to obtain as much difference as possible between milk fat and its substitute, he selected for the substitute a vegetable fat, namely that obtained from coconut; this fat has been used for cooking purposes as a butter substitute. The chief fats are those obtained from plants. Coconut fat also contains 99 per cent. pure fat, which is not usually the case with other similar substitutes. The adulteration is so far out of the question, as no cheaper raw substitute can be found. By mixing 35 grams in about 1 litre of skim milk, a milk with 3½ per cent. of fat was obtained, i. e. one corresponding to the average milk used in rearing, for it is of no special advantage to calves milk which is extra rich in fat.

In order to make a suitable mixture, the fat and skim milk are heated to 60° C. and passed through an emulsion drum. Emulsion machines of this kind are supplied by the firm of E. Bazzi and Co. (Engineers) of 4 Viale Venezia, Milan, Italy, and Messrs. R. A. Lister and Co., Ltd., Ley, England. The object of both these machines is to obtain a mixture of skim milk and of melted plant fat suitable for feeding; the mixture must not be allowed to stand, but should be made fresh each time as the fat rises like that of whole milk, and thus each calf does not receive the necessary proportion of fat and skim milk. It is not possible to mix the plant fat and skim milk with a hand apparatus, and all attempts which have been made to do this have proved unsuccessful. It has been shown by experience that the use of so-called emulsion-milk is under certain circumstances, to cause scour; but this can be largely avoided by pasteurizing the skim milk.

The feeding is done according to the accompanying tables (pp. 169 and 170).

These tables are taken from "Leitfaden der Wartung und Pflege des Milchviehes" by Dr. Paul Schuppli, published by Messrs. Parey, Berlin.

The calves are usually fed three times a day for the first few days. After a week, this is gradually reduced to twice, so that the daily amount given in the tables is fed in two portions, early in the morning and in the evening. It should be mentioned that the calves are given hay when they are a week old, but no water till the daily ration of emulsion and milk begins to decrease, and then 1¼ quart of water is substituted for every quart of milk which is withheld; it is however always given with the dry food, instead of before, as was the case with the emulsion. When the calf is 8 weeks old, it is given oats and wheat bran; the amount for the heifer calf is 1 lb. each of oats and wheat bran, until the milk is withheld altogether; while for bull calves, the amount is 3 lbs. of the two together. Towards the end of the first year, this ration is gradually reduced and finally ceases in the case of the heifer calf, but the bull calf is given oats and bran for over a year. The best food for the heifer is not one which influences milk production, for it is only the first stage of development which should be taken into consideration.

TABLE I.
Bull Calf.

Quarts ^a per day				Total amount (gallons)			
Milk from its dam	Whole milk	Emulsion milk	Skim milk	Milk from its dam	Whole milk	Emulsion milk	Skim milk ^c
6	—	—	—	13 ³ / ₄	—	—	—
—	7	—	—	—	10 ³ / ₄	—	—
—	7	1	—	—	3	¹ / ₂	—
—	6	2	—	—	2 ³ / ₄	1	—
—	5	3	—	—	2 ¹ / ₄	1 ¹ / ₄	—
—	4	4	—	—	1 ³ / ₄	1 ¹ / ₄	—
—	3	5	—	—	1 ¹ / ₄	2 ¹ / ₄	—
—	2	6	—	—	1	2 ³ / ₄	—
—	1	7	—	—	¹ / ₂	3	—
—	—	9	—	—	—	27 ³ / ₄	—
—	—	10	—	—	—	61 ¹ / ₂	—
—	—	8	2	—	—	61 ¹ / ₂	15 ¹ / ₂
—	—	7	3	—	—	21 ¹ / ₂	9 ¹ / ₄
—	—	5	4	—	—	15 ¹ / ₂	12 ¹ / ₄
—	—	3	5	—	—	9 ¹ / ₄	15 ¹ / ₂
—	—	2	6	—	—	6 ¹ / ₄	18 ¹ / ₂
—	—	—	8	—	—	—	24 ¹ / ₂
—	—	—	6	—	—	—	27 ³ / ₄
—	—	—	4	—	—	—	18 ¹ / ₂
Total . . .				13 ¹ / ₄	23	215 ¹ / ₂	141 ³ / ₄

In this part of the table the litre is taken as equal to the quart, so as to avoid fractions; in the exact amounts given by the author, subtract one-eighth from the figures: thus 13 becomes 12 ⁷/₈, and 8 becomes 7.

The following table gives the results which have so far been obtained with calves reared on emulsion milk at the Grabnerhof School of Alpine Cattle from 1905 to September 1912.

	Number	Average increase per calf per day lbs.
Murboden heifer calves	90	1.63
Murboden bull and steer calves	78	2.05
Pinzgau heifer calves	44	1.70
Pinzgau bull and steer calves	46	1.91
Total number of calves	258	1.82

TABLE II.
Heifer calf.

No. of Days	Quarts *) per day				Total amount (gallons)		
	Milk from its dam	Whole milk	Emulsion milk	Skim milk	Milk from its dam	Whole milk	Emulsion milk
10	5	—	—	—	11	—	—
7	—	6	—	—	—	9 $\frac{3}{4}$	—
2	—	6	1	—	—	2 $\frac{3}{4}$	$\frac{1}{2}$
2	—	5	2	—	—	2 $\frac{3}{4}$	1
2	—	4	3	—	—	1 $\frac{3}{4}$	1 $\frac{1}{4}$
2	—	3	4	—	—	1 $\frac{3}{4}$	1 $\frac{3}{4}$
2	—	2	5	—	—	1	2 $\frac{1}{4}$
2	—	2	6	—	—	1	2 $\frac{3}{4}$
2	—	1	7	—	—	$\frac{1}{2}$	3
14	—	—	8	—	—	—	24 $\frac{1}{2}$
14	—	—	6	2	—	—	18 $\frac{1}{2}$
14	—	—	5	3	—	—	15 $\frac{1}{2}$
14	—	—	3	5	—	—	9 $\frac{1}{4}$
14	—	—	2	6	—	—	6 $\frac{1}{4}$
14	—	—	—	8	—	—	—
14	—	—	—	6	—	—	—
14	—	—	—	4	—	—	—
7	—	—	—	2	—	—	—
150	Total . . .				11	19 $\frac{1}{2}$	86 $\frac{1}{4}$

*) See note under preceding table.

They were, as is seen, relatively satisfactory: not much more be required for producing cows of good performance which are he and possess good powers of resistance.

Stress should be laid on the fact, that a hardening system was set out simultaneously with the prescribed method of rearing. Consequently, the growth of the animals was less in proportion than if they had stable-reared, but the often greatly increased growth which sometimes occurred in spite of similar feeding is thus explained. When they were fortnight old, the calves are taken every day in winter to the exercise ground, which has a sunny aspect but no special shelter; in summer they are turned into a pasture, where they at once begin accustoming themselves to a grass diet. Of course, they are still fed in the stable

and the same amount of bulky food is given till they are able to sufficient grass, when of their own accord they refuse the corresponding amount of dry fodder. In this way, the grazing period is got without scouring or much loss of weight. The only precaution taken in bad weather consists in rubbing down the very young calves straw as soon as they return to the shed, to prevent chill. The chief advantage in emulsion feeding is that the same results obtained as with a mixture of whole and skim milk and at far less

of this the figures in Table IV (next page) give the best proof.

Remarks on Table IV.

- 1) The price of whole milk is taken at 18 heller per litre ($8\frac{1}{4}$ d. per gallon) account of the general rise in the price of milk.
- 2) The cost of preparing 25 gallons of emulsion milk is reckoned as follows:

gallons of skim milk at $2\frac{1}{4}$ d.	s	d
2 quarts lacking are made up by the coconut fat, of which $8\frac{3}{4}$ lbs. will make the total up to 25 gallons).	4	7
lbs. of coconut fat at $6\frac{1}{4}$ d. per lb. (including carriage and preparation) . . .	4	$6\frac{3}{4}$
of preparing 25 gallons of emulsion milk (including depreciation on machine)	3	
of 25 gallons of emulsion milk	9	$4\frac{3}{4}$
therefore one gallon will cost $4\frac{1}{2}$ d.		
- 3) A fifteen years' average at the Grabnerhof School of Alpine Economy gave 207 milking days and 138 grazing days. The costs of the stall-feeding and grazing days for milk and bull calves are based on the experience obtained there.
- 4) The straw requirement is small, owing to the shortness of the stalls and the depth drainage gutter: the amount allowed is enough for calves up to a year old.
- 5) A man who milks 16 cows receives:

	£	s	d
: per month 26s. 8d., or per year	16	0	0
and lodging: per month 23s. 4d.; per year	14	0	0
Total . . .	30	0	0
- 6) Attention for one cow therefore comes to 1 17 6
- 7) Milking one-third for a calf 12 6
- 8) The cost of stabling for one cow (including food rooms, manure pit and water troughs) comes to about 33 6 8
- 9) Interest at 4 % and upkeep at 2 %, the cost per cow per year will be 2 0 0
- 10) Milking one-third for a calf 13 4
- 11) Light and veterinary expenses are reckoned for a cow at 5 0
- 12) Alf 1 8
- 13) The management of breeding must certainly be included in the cost of rearing, on the assumption that every breeder will incur certain expenses for the useful purposes of balance tests and selection of stock; and will also pay a subscription to his Association.
- 14) The value of the dung is estimated according to the amount produced, and it is assumed that there is a suitable pit for storing it.

In these rearing expenses the value of the calf is not included, as this depends on its breed, descent, etc., and is therefore very variable, as is

TABLE IV.

Substance	Unit price	For a Heifer Calf			For a Bull Calf		
		Reared on whole milk, and some skim milk		Reared on whole milk, emulsion milk and skim milk	Reared on whole milk, and some skim milk		Reared on whole milk, emulsion milk and skim milk
		Quantity	\$ s. d.	Quantity	Quantity	\$ s. d.	Quantity
Whole milk	1 gallon	166 gall.	5 13 5	30 gall.	333 gall.	11 6 9½	36 gall.
Emulsion milk	1 gallon	—	—	72 gall.	—	—	215 gall.
Skim milk	1 gallon	80 gall.	15 2	108 gall.	149 gall.	1 8 0	141 gall.
Wheat bran	1 cwt.	220 lbs.	16 8	220 lbs.	264 lbs.	1 0 0	264 lbs.
Wheat bran	1 cwt.	220 lbs.	10 0	220 lbs.	264 lbs.	12 0	264 lbs.
Salt	1 cwt.	2¼ lbs.	— 1½	2¼ lbs.	2¼ lbs.	— 1½	2¼ lbs.
Stall-feeding days . .	1 day } bull — 2 } heifer — 2¼	207 days	14 6	207 days	207 days	1 18 0	207 days
Grading days	1 day } bull — 1½ } heifer — 1¼	158 days	15 9½	138 days	158 days	— 18 5	158 days
Straw	—	—	4 2	—	—	4 2	— 4 2
Attendance	—	—	12 6	—	—	12 6	— 12 6
Rent of shed	—	—	13 4	—	—	13 4	— 13 4
Light and vet. . . .	—	—	1 8	—	—	1 8	— 1 8
Breeding management	—	—	12 6	—	—	12 6	— 12 6
TOTAL	—	—	12 9 10	—	—	19 7 6	— 13 6 0
To subtract for dung . .	—	—	1 9 2	—	—	1 13 4	— 1 13 4

the danger of loss. The expenses must be understood to refer to that which is safely reared. The difference in cost between rearing calves on whole and skim milk compared with the expense of using emulsion milk as well as whole milk is, as the above table shows :

For a heifer calf	£3
For a bull calf	£6 1s. 6d.

Thus the advantage is on the side of the emulsion-milk system, as the saving is very considerable, the trouble and labour entailed in making the emulsion milk is fully repaid.

It still remains to be shown that the final weight of cows reared on emulsion is not inferior to that of animals raised in the ordinary way.

There was no difference in the final weight of five-year-old Murrah and Pinzgau cows reared according to these two systems at Grabhof. The weight of 19 Murboden cows in 1906 averaged 1302 lbs.; in 1907 43 cows averaged 1346 lbs., and amongst the latter were 12 animals which had been reared on emulsion. Thus, in this case, the final weight increased rather than the reverse.

The emulsion system is certainly troublesome and requires great attention, but as the foregoing statements have shown, it is remunerative and much to be recommended. This has been proved by eight years' experience at Grabnerhof, and is corroborated by the experience gained at other estates.

Measures adopted in Sweden to spread Book-keeping among Farmers

by

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Up to recent years, when the measures adopted in Sweden to promote book-keeping among farmers were discussed, the only one that could be mentioned was the instruction given in this subject in the higher and technical schools of agriculture. It is true that some associations of rural communities, among others that of the province of Malmöhus, had since 1880 published forms of book-keeping adapted to the requirements of small and medium farmers. But it was only with the introduction of book-keeping for small farms that book-keeping was more generally introduced. In the last twenty years, every year and in each province an examination is made of small properties (up to 30 acres) worked by their owners, and the most deserving are given rewards of which there are three classes.

It was established in 1902 by the Statutes regulating these remarks that "the farmer who for his farm has received a prize in money may not be awarded a second prize for the same farm unless he submits to the Commission of prizes his notes drawn up according to the forms laid upon by the Direction of Agriculture, and collected by him since the year at which the first prizes were distributed." Thanks to this method of obliging farmers who wish to compete for the State prizes for small farms to keep their books, a well regulated system of book-keeping has penetrated very widely among the more advanced small farmers.

In the larger farms the Italian system of book-keeping by double entry is adopted almost without exception; among medium sized farms it is also very frequent to find that book-keeping, at least by single entry, is practised; but with the exception of the small farms that have obtained prizes, the practice of book-keeping has spread only to a trifling extent among small farmers. Nevertheless of late years it has been observed that the interest in book-keeping has increased in a most satisfactory manner among Swedish farmers, and it may be added that the same is true of the small and medium farmers have not been less keen than the others. For many facts there are several reasons. Thus, the ever increasing intensity of farming has caused the need of control to be more sensibly felt. The spread of Control Associations (at the beginning of 1912 Sweden possessed upwards of 700 associations for the control of dairies and in general also pig rearing concerns) has contributed a good deal to a better understanding of the economic importance of agricultural book-keeping. Besides by the law of 1910, which establishes taxation on capital and on income, agricultural book-keeping has, to a certain extent, been rendered compulsory in Sweden, as, according to this law, the net income of the farmer is the basis for taxation by the State, and as soon as the assessed value of an estate exceeds 25 000 crowns (£1357) the farmer must be prepared to confirm the correctness of his individual declaration by his well-kept books.

Owing to the prominence thus given to this question, the campaign to encourage book-keeping especially among small and medium farmers has been carried on with renewed energy. Among the measures lately adopted in order to extend the movement among practical farmers the following may be mentioned:

1. *The creation of agricultural book-keeping bureaux.*—In 1909 and 1912 bureaux of agricultural book-keeping have been established in several provinces by associations of rural economy and by other associations formed especially for the purpose. In order to explain the organization of these bureaux the following extracts are given from the Statutes of the agricultural book-keeping association of the province of Malmöhus, which has its seat at Malmö (at present this association, which numbers about 100 members possessing among them a total of 141 000 acres, is the most important):

"The Association is organized as an economic association with personal liability, and a representative of the Society of rural economy in the province has a seat on the committee.

The book-keeping bureau established by the Association has the following objects in view: keeping and closing complete farming accounts on the reports or yearly journals sent by farmers; auditing accounts; making inventories; drawing up individual declarations; distributing forms for book-keeping; and compiling, from the material which it receives, statistics of a certain importance for elucidating economic questions of general interest."

As for the diffusion of book-keeping, this is divided into three principal categories: A, simple agricultural book-keeping; B, more extended book-keeping, with special accounts for the various branches of farming; to which is added for C a detailed control of the returns of the various crops."

The subscription to be paid for the keeping of books is based on the amount spent for each member, and the minimum fee for closing accounts for the three types of book-keeping above mentioned, 20, 40 and 60 shillings (£1 1s. 8d., £2 3s. 4d. and £3 5s.) respectively. The sum to be paid for keeping the books has varied up to the present from 0.50 to 2 shillings per hectare of field (2½d. to 10½d. per acre) according to the size of the farm and the more or less complete system of book-keeping.

This association works also in connection with the control associations; the assistants of the latter assist the farmers in keeping their current accounts, after which the control and closing operations are done at the book-keeping bureaus.

2. *The appropriations granted by the State and the Associations of rural economy for the spread of the practice of book-keeping among small farmers.*—According to a resolution voted by Parliament in 1911 a sum of 100,000 crowns (£900) is granted every year for distribution among the farmers, who apply to the book-keeping bureaus approved by the State and by the association of rural economy. This subsidy is paid to the book-keeping bureaus to which the farmers have entrusted the closing of their accounts, and it amounts to 15 crowns (16s. 3½d.) during four years for each account closed in the course of the year, for farms not exceeding 100 acres of arable land; it is given on condition that the interested association of rural economy pays an equal sum.

3. *Special courses of book-keeping for farmers.*—Two years ago, on the initiative of the associations of rural economy and of some private persons, a great number of courses of book-keeping were organized throughout the country for the benefit of farmers. These courses, which have only a few days, have generally been well attended. Further, instruction in simple agricultural book-keeping is frequently a part of the programme of the complementary schools attached to the primary schools in the country.

An active campaign is thus being carried on in several ways throughout the country, with the object of spreading the practice of agricultural book-keeping, and it is to be hoped that, with time, this work will be rewarded by success.

SECOND PART.

ABSTRACTS

AGRICULTURAL INTELLIGENCE

GENERAL INFORMATION.

- The Encouragement of Flax, Hemp and Olive Growing in France.

Encouragements à la culture du Lin, de la Chanvre et de l'Olivier en France. — *J. Officiel de la République Française*, Year XLIV, No. 344, p. 10576. Paris, December 18, 1912.

The law of April the 9th 1910 allots to cultivators of flax and hemp from the commencement of the financial year of 1910 and for a period of six years, prizes to an annual amount (including expenses of verification and control) not exceeding 2 500 000 fr. (£100 000), and which will be allotted, within the limits of this sum, in proportion to the extent of the areas sown, the minimum extent being 20 acres, the sum at no time exceeding about £1 per acre (60 fr. per ha.). The amount of this prize is fixed for the financial year of 1912 at £1 per acre.

By a ministerial decree of December the 16th 1912, the amount of the prize for the cultivation of the olive allotted by the law of the 13th 1910 (1) is fixed for the financial year of 1912 at 5s. 6d. per acre (17 fr. per ha.).

93 - Regulations for Cattle Sales on a Large Scale in the La Villette Market, Paris.

Réglementation des ventes en gros sur le marché aux bestiaux de la Villette. — *J. Officiel de la République Française*, Year XLIV, No. 344, pp. 10575-10576. Paris, December 18, 1912.

By the decree of the 27th of June, 1912, a Commission was appointed at the Ministry of Agriculture for the purpose of considering the amendments to be introduced into the decree of the 22nd of January, 1911, regarding sales on a large scale in the Paris markets, in order to enable cattle to be purchased at first hand in the market of La Villette.

The members of the Commission were nominated by a decree of the 16th of December, 1912.

⁽¹⁾ See No. 2666, B. Aug.-Sept. 1911.

Horticulture in the Hungarian Budget for 1913. (Extract from the statement on the budget of the Royal Hungarian Ministry of Agriculture.)

Gartenbau, Obstbau und Baumzucht in dem Staatsvoranschlag für das Jahr 1913. — *Volkswirtschaftliche Mitteilungen aus Ungarn, Zur Orientierung des Auslandes herausgegeben vom kónigl. ung. Handelsministerium, Year VII, Part X, pp. 1438-1444. Budapest, October 1912.*

Under the head of personal expenses of class 26, chapter XX (horticulture) the following sums were allocated :

For 1912	.....	£ 6 350
For 1913	.....	£12 635
Increase for 1913		£ 6 285

Owing to the limited means at the disposal of agriculture for this purpose, the Minister of Agriculture has decided to rent fields near towns, industrial establishments and watering-places, for the growth of vegetables and flowers, and to give spare time employment to children who to improve in horticulture, instead of costly lectureships, which will be of little use only be established in a few important places.

At the same time, coloured photographs of plants, fruits, etc., will be prepared, for the instruction of the children during the winter by means of lantern projections. These practical meetings will be continued for year or two by the ordinary agricultural staff, till the schoolmasters (other State employes) have qualified for the continuation instruction of the children.

Among temporary expenses, £1667 have been appropriated under the heading: "for publishing market prices of horticultural produce, for the organization of sales of the same." This expenditure is amply justified by the state of the markets, which clearly show the lack of information concerning buying and selling.

To remedy this state of affairs in the future, an organization will be created under the Ministry of Agriculture, consisting of employes of this department, reporters and persons who have gained some State certificate in horticulture; by means of this, the trade will be able to have information on the market prices of the whole country, and the central organization will have a sure foundation for the rational introduction and extension of certain branches of production, while preventing its happening at the demands made by foreign countries cannot be acceded to owing to lack of information as to the provenance of goods.

In connection with this question, the sale of the products must be attended to, especial care being taken that the small growers are not too much at the mercy of middlemen. Small growers must be able to sell their products to reliable salesmen, and must be instructed in grading and packing; the realization of this double purpose is only attainable by material assistance, for the necessary guarantees can only be obtained — till such time as commercial confidence in this organization is established — by payments in hard cash,

The Royal Hungarian Ministry of Agriculture wishes to assist commercial enterprise by appointing packers, and by the grafting of trees by State agents in cases where obstacles to the activity of the organization are formed by the lack of uniformity in the fruit trees. It also wishes to bear the expenses of organizing fruit markets where grafting and packing of the products purchased in advance are carried out at the grower's.

For starting and helping market-gardens, £833 were voted in 1912.

The organization of such market-gardens was taken up by the municipalities, communes and corporations.

At the same time, to obtain greater and more lasting results, it is necessary to support the production of the types of fruits whose market value is increasing, and for this purpose existing centres of production should be encouraged and fresh ones started.

With regard to the improvement of quality, which necessitates the creation of Experiment Stations, the State will undertake to bear considerable expense; it will also see to the formation of new central stations for proprietors can only start on market gardening when there are ample to follow and success is plainly evident.

The State should therefore organize the whole production by starting undertakings cheaply, and arranging for their direction by competent State officials who will teach the people.

For starting and assisting establishments for horticultural seed improvement, the budget has allocated £833.

The production of agricultural seeds has been greatly encouraged by the company for the "production of Hungarian agricultural seeds" which also undertakes the growing of some vegetable seeds. The activity of this society, however, is directed only to exportation.

To do away with the disadvantages of getting the seed required from abroad, the first thing would be to set up small establishments for seed-growing on plots surrounded by small farms. The results obtained would be made known among the growers, who would then themselves take part in it.

The production of seed might be increased if the director of the central station were to undertake the giving out of reliable information, and if the purchase of the seed grown were guaranteed in advance, as the business firms of seed merchants have declared they would be willing to do.

In spite of the favorable climatic conditions, which allow of early ripening, and the conditions of the soil, which encourage quick multiplication, the growing of hyacinths and tulips and other bulbs is still very limited; steps are being taken to increase this branch.

For 1912 £6000 were allotted, and for 1913 £22 500; the increase of £16 500 is destined for new buildings, greenhouses, etc., in the establishments.

Growth and Usefulness of the Publication Work of the U. S. Department of Agriculture.

SON, JAMES (Secretary of Agriculture) in *Report of the Secretary of Agriculture, 1912*, 115-117 and *passim*. Washington, 1912.

Secretary Wilson concludes his record of 16 years at the U. S. Department of Agriculture; this period began in 1897 with a yearly farm production worth \$4 000 000 000 and ends with \$9 532 000 000, and the production in 1912 has been the greatest in the history of the United

States. Along with this increase, the number of persons employed by the department grew from 2 444 in 1897 to 13 858 on July 1, 1912, and the appropriations for the department increased from \$3 272 902 for the year ending June 30, 1898, to \$24 743 045, for 1913. Secretary Wilson states that in wealth produced and conserved during these 16 years the U. S. Department of Agriculture has returned more than ten times the appropriations; and that the publication work of the department is an unerring indication of its growth and usefulness.

Evidences of growth and usefulness. — The records of the Division of Publications, in which the publication work is centralized, show that the number of mail requests for publications barely exceeded 500 letters a week, while during the past year, the weekly mail has exceeded 1 000 letters, or more than 100 letters for each one received at the earliest date.

With a printing fund of \$116 888, the different publications printed in 1911 were 424, and the editions aggregated 6 541 210 copies; in 1912, with an appropriation of \$470 000, the different publications were 2110, aggregating 34 678 557 copies.

The work of the Division of Publications reflects, and it is assumed always represents, the activity of the other offices of the department.

All the information acquired in the several bureaus by the means in command finds its expression necessarily in the form of publications which pass through this office. Every enlargement of the scope of work covered by any other office, especially the adoption of new lines of work, involves an addition to the work of the Division of Publications.

The appropriations for the fiscal year 1897 disbursed by this division for salaries, supplies, etc., amounted to \$44 367, while for 1912 they were \$209 960, an increase of nearly 475 per cent. In 1897, the number of employees in the division was 61, and in 1912 aggregated 197, an increase of nearly 225 per cent.

Number of copies distributed. — During the 1897-1912 period over 100 000 000 copies of publications have been distributed to those engaged in farming. Of this number slightly more than 88 000 000 were Farmers' Bulletins. Although the series of Farmers' Bulletins was begun in 1889, only about 5 000 000 copies had been issued by 1911, and those distributed during that year amounted to less than 1 000 000 copies, while during the year 1912 over 10 000 000 copies were

distributed. Previous to the period under discussion only 41 *disseminations* Farmers' Bulletins had been prepared, and at present there are separate pamphlets discussing nearly every phase of modern agricultural operations.

It is stated that no other Government issues as many publications as does the United States, and that no executive department of the Government issues as many publications as does the U. S. Department of Agriculture in performing its function of acquiring and disseminating useful information in regard to agriculture. But the rapid increase in the population of the country and the great popularity acquired by the documents of the U. S. Department of Agriculture have so augmented the demand that the department has not in recent years had an appropriation that permitted the printing of a sufficient number of copies to meet the demand.

The U. S. Congress, however, has provided a solution of the problem by authorizing the Superintendent of public documents to acquire and sell at a nominal price such documents as may be required. The enormous increase in the sale, by that official, of the U. S. Department of Agriculture publications is surprising when it is remembered that millions of copies are distributed free, both by the Department of Agriculture and by Members of Congress. During the last fiscal year 177,000 copies were sold by the superintendent of public documents, for which he received \$16,428.

The magnitude of the work of disseminating the vast fund of information so systematically sought and so scientifically verified is commensurate with the enormous advance made in the application of scientific knowledge to practical agriculture of the United States — a result to which the U. S. Department of Agriculture has contributed no small share. The improved conditions on farms, the increased yields of crops, the improved breeds of live stock, and the new varieties of fruits resulting from the labors of the U. S. Department of Agriculture as detailed and explained in its publications have added many millions to the wealth of the American Nation.

96 - Yellow Fever and Mosquitos.

HOWLETT, F. M. in *The Agricultural Journal of India*, Vol. VII, Part IV, pp. 39. Calcutta-London, 1912.

India has so far been immune from yellow fever; but there is always the possibility of its introduction. The probability that the disease once introduced would spread with any rapidity depends on the presence of certain mosquitos.

The organism which causes the fever is so minute that it has not been possible to isolate it, but it is known that the disease is propagated from a patient suffering from yellow fever to a healthy person by the bite of a mosquito known as *Stegomyia fasciata*. It is a "domestic" mosquito, and is generally found in or near human dwelling places, and breeds in almost any small casual accumulation of water (such as

ns, broken pots, the cut ends of bamboos, etc.). Unfortunately it is yet known whether the other species of the genus *Stegomyia* are as dangerous or whether they must be regarded as dangerous. Judging by the case of *Anopheles* mosquitos and malaria, it seems likely that some or all of the other species of *Stegomyia* might be capable of carrying yellow fever.

In the large Indian sea-ports, and particularly in Bombay and Calcutta, *S. fasciata* is a common insect. On the other hand, in the inland districts they are by no means abundant, and though widely distributed are represented only by a few scattered individuals, while *S. scutellaris* is very common.

It is evident from this that if yellow fever were introduced into the country, *S. fasciata* were the only carrier, the disease would be limited to the coastal districts and sea-ports; but if *S. scutellaris* is also a carrier it would spread infection all over the country.

The distribution of the different species of *Stegomyia* in the larger districts is now being ascertained with accuracy by a number of medical officers, and this investigation has particularly in view the seasonal occurrence and normal breeding-places of *S. fasciata*.

S. scutellaris breeds mostly in the small accumulations of water in the cut ends of bamboos, or in trees. The adult *Stegomyia* perish during winter, while their eggs survive. These eggs are laid in water which at the beginning of the dry weather soon evaporates, but the eggs live on until left dry, until the coming of rain and a proper temperature enable them to hatch. It is believed, though it is not yet wholly confirmed, that yellow fever can be conveyed by the offspring of an infected mosquito as well as by the parent itself. Therefore the plan advised by the authorities aims at destroying all the hibernating eggs, suppressing as far as possible the casual natural breeding places, and at the same time providing artificial ones in which at suitable times all the eggs and larvæ might be reared and destroyed.

The Copra Itch.

— CASTELLANI, ALDO.: Note on Copra Itch.

— HIRST, STANLEY.: Report on the Mite causing Copra Itch. *The Journal of Tropical Medicine and Hygiene*, Vol. XV, No. 24, pp. 374-375, 2 figs. London, December 16, 1912.

— Already for some years past, the writer had observed that the persons working in the copra mills were affected by a peculiar eruption, which extended from the hands to the arms, legs, and trunk, but never to the face. The eruption much resembles scabies in its external appearance, except that no burrows or cunicula are present. It is due to quite a different parasite, which Mr. Stanley Hirst has named *Tyroglyphus* var. *castellani*. This acarus was met with on the epidermis of patients and in the copra dust. It does not appear to make true ulcers, but seems to induce dermatitis in the same manner as *Pedicularis ventricosus* Newport, which lives in diseased cereals and produces an eruption in persons handling the latter.

The writer reproduced the disease experimentally. The cocoon has very little or no tendency to heal spontaneously, unless the insect abstains for some time from his work in the copra mill. Beta-naphthol ointment (5-10 per cent.) has proved a very useful remedy.

2. — Mr. Stanley Hirst gives a description and figures of the pupa in question and mentions that according to Michael ("British Tropical Hygiene", Vol. 2, pp. 123-131) *T. longior* has a very wide distribution in Europe and is found on most kinds of dried or preserved animal and vegetable matter, especially upon dried provisions.

- Experiments with Crude Carbolic Acid as a Larvicide in Guiana.

WISS, K. S., and MINETT, E. P. in: *The Journal of Tropical Medicine and Hygiene*, Vol. 15, No. 23, pp. 358-359. London, December 2, 1912.

Floating larvicides, such as paraffin, either in its pure or emulsified state, and even heavy petroleum oil, are practically useless in Guiana for, owing to the strong wind always blowing, and the absolute flat open nature of the soil, such substances are quickly blown to one side and evaporated before their asphyxiating properties can come into play. In the case of large areas of water, such as drainage tanks, many larvae can be destroyed by keeping the water well stocked with small fish known locally as "Cockerbellies" and clearing away all interfering vegetation as far as possible, but these fish are often unable to get access to the many small depressions in the land holding temporary water. In these cases and under similar conditions in the laboratory the writers experimented with crude carbolic acid, using the larvae of *Culex fatigans*, *Stegomyia fasciata*, other Culicidae, *Taeniorhynchus*, *albipes*, and *C. argyrotarsus*. Under natural conditions, the larvae in the small pits when treated with carbolic acid were seen to die in an hour, but in the case of the pupae the time was much longer, frequently as much as 24 hours.

A dilution of 1 part of crude carbolic acid in 20 000 is completely efficacious. Purified carbolic acid acts more rapidly, but is not effective in such high dilutions; further, it evaporates more quickly. The method treated in this manner is not harmful to animals, but they do not die readily on account of its tarry odour and blackish colour.

The writers have observed that, owing to its containing some constituents insoluble in water, crude carbolic acid does not lend itself to being sprayed over large areas with a Mackenzie spray, but by constantly stirring the mixture in a bucket during the process a fairly satisfactory distribution can be obtained.

When a large area of ground containing a number of small holes, such as foot prints, has to be treated, it has been found more satisfactory to use substances which mix more easily with water, such as cyllin, naphtholeum, or Sanitas okol, although the expense is much greater.

Agricultural Continuation Schools in Belgium.

d'Agronomie aux adultes. — *Ministère de l'Agriculture et des Travaux publics, Bulletin de l'Agriculture et de l'Horticulture*, Year II, No. 4. Bruxelles, 1912.

ing the winter months 1912-13 agricultural continuation-school on will be imparted in 401 communes, and rural housekeeping will be held in 143.

y are distributed in the various provinces as follows :

Province	Communes with continuation schools	Communes with housekeeping courses
Antwerp	28	5
Brabant	45	13
West Flanders	78	7
East Flanders	50	31
Hennegau	47	11
Liège	33	3
Limburg	48	44
Luxemburg	40	23
Namur	32	46

the 190 teachers who conduct the boys' continuation schools, elementary school teachers and inspectors, 52 agricultural teachers (ingénieurs-agronomes), 22 agricultural travelling lecturers (confé-agricoles), 29 professors and veterinary surgeons, 24 various (clergymen, etc.). The housekeeping courses are held by 35 achers, mostly teachers in housekeeping schools or travelling ping schools.

Central Agricultural Shows in France in 1913.

relatif aux concours centraux agricoles en 1913. — *Feuille d'Informations du Ministère de l'Agriculture*, Year XVII, No. 51, p. 2. Paris, December 24, 1912.

the decree of December 18, 1912, the Minister of Agriculture has town his decision that 8 central agricultural shows shall be organized in the following towns : Antibes, Châteauroux, Epinal, Evreux, montauban and Nantes. The Antibes competition will take place arch 10 to 16, 1913. The programme of this exhibition can be l by those interested from the Ministry of Agriculture and the res of the Mediterranean district. The dates of the other shows : announced later.

Packing Industries' Exhibition in Paris, July to October 1913.

sition d'Emballages à Paris, Juillet-Octobre 1913. — *La Petite Revue agricole et hor-*, Year 19, No. 434, p. 6. Antibes, January 12, 1913.

nn July to October 1913, there will be held at the Grand Palais Champs Elysées the first International Exhibition of packing and industries, organized by the "Syndicat National et Mutuelle-Trans-munis."

For all further information, apply to the Administration, 4 Biscornet, Paris 12, or to the Commissariat général, Bourse de merce, N^o. 63.

102 - Agricultural Shows in Great Britain in 1913.

Society holding Show.	Date	Place
Shire Horse	25-28 February	Islington (La)
Hackney Horse	4-7 March	"
Hunters' Improvement	11-13 March	"
Polo and Riding Pony	14-15 March	"
Bath and West and Southern Counties . .	27-31 May	Truro
Royal Counties	10-13 June	Windsor
International Horse Show	20 June - 1 July	Olympia (La)
Royal Agricultural Society of England . .	1-5 July	Bristol
Highland and Agricultural Society of Scotland	8-11 July	Paisley
British Dairy Farmers	21-24 October	Islington (La)
Birmingham Cattle and Poultry Show . .	29 th Nov. - 4 Dec.	Birmingham
Smithfield Club	8-12 December	Islington (La)

103 - Horticultural Exposition at St. Petersburg.

Daily Consular and Trade Reports, 15th Year, No. 292, p. 1325. Washington, 1
ber 12, 1912.

Under the patronage of the Russian Department of Agriculture International Horticultural Exhibition will be held at St. Petersburg April 1913. The exhibition will consist of the following sections: Bee culture; decorative horticulture; hothouse plants and outdoor plants; pomology; fresh and preserved fruits; vegetables; preservation and of fruit and vegetables; grains; bee-culture; silkworm culture; plants; scientific section; scholastic section; tools, instruments, and terial for horticulture; floral art and a commercial section.

104 - Stock-breeding Exhibitions Subsidized by the Government held in Uruguay in 1913-1914.

Fechas para la celebración de las Exposiciones subvencionadas por el Gobierno
Revista de la Asociación Rural del Uruguay, Year XII, No. 10, p. 785. Montevideo
October 1912.

The Presidential Decree of September 10, 1912, has fixed the dates and places for the stock-breeding exhibitions, subsidized by

ment. Rural Societies have the power to organize non-subsidized shows.

Places where Exhibitions will be held	Date	
Montevideo	Aug. 25, 1913	
Salto	First Sunday in Sept. 1913	
San Eugenio	2nd " " " "	
Livera	3rd " " " "	
Selo	4th " " " "	
Waysandu	1st " " Oct. "	
San Fructuoso	2nd " " " "	
Dolores	3rd " " " "	
San Rosa	4th " " " "	
Filias	1st " " Nov. "	
Sercedes	2nd " " " "	
Tray Bentos	3rd " " " "	
Solles	4th " " " "	
Asciano	1st " " Dec. "	
Treinta y Tres	2nd " " " "	
Maradi del VI	3rd " " " "	
Tranqueras	4th " " " "	
Armen	2nd " " Feb. 1914	
Nueva Helvecia	3rd " " " "	
Faldonado	4th " " " "	
Florida	1st " " March "	
Puntas de Maciel	2nd " " " "	
San José	3rd " " " "	
Colonia	4th " " " "	
Jurazno	1st " " April "	
Rocha	2nd " " " "	

Second International Congress of Instruction in Household Management at Ghent, Belgium, in June 1913.

Congrès international de l'Enseignement ménager à Gand, Belgique, en Juin 1913. *Congrès de Belgique. Exposition universelle de Gand 1913. Deuxième Congrès international de l'Enseignement ménager. Invitation.*

has been decided in conjunction with the International Office of Instruction in Household Management at Fribourg, Switzerland, the second International Congress of Instruction in Household Management shall be held at Ghent in 1913, during the Universal Exhibition towards the end of June.

Office of Secretary-General: 19, Rue Willems, Bruxelles.

Third International Congress of Farm Women at Ghent, June 12 to 15, 1913.

Congrès International des Cercles de Fermières à Gand, du 12 au 15 Juin 1913. *Congrès de Belgique. Exposition Universelle de Gand 1913. 3me Congrès International des Cercles de Fermières. Invitation.*

is only fifteen years, at the most, since the first farm women's organizations were instituted in Canada and the United States. See also

ago, they were established in Belgium and still more recently in Poland, Austria, Hungary and France, and the formation of similar societies is announced at an early date in Germany and Spain. The International Congress of Farm Women was held at Colorado Springs, United States in 1911; the second at Lethbridge, Alberta, Canada the third will take place at Ghent in 1913 during the Universal Exhibition from June 12 to 15. Secretary's Office: 38 Rue du Pépin, Brussels.

CROPS AND CULTIVATION.

107 - Electric Niagaras in Recent Thunderstorms. (1)

LAFORREST, M. A.: Les Niagaras électriques et les récents orages. — *Journal de la Société Nationale d'Horticulture de France*, 4th Series, Vol. XIII, pp. 572-574. Paris, September 1912.

The electric niagaras which have been in use for eleven years in the department of Vienne are said by the inventors to have afforded complete protection from hailstorms during that period. This statement, corroborated by numerous inhabitants of those regions, was investigated by M. Turpain of Limoges in 1911; he reported that the instruments were of little value, and in the same year a building in Poitiers which had the apparatus was struck by lightning and set on fire. Notwithstanding this evidence, a powerful instrument was installed at the top of the Eiffel Tower, which was to afford protection to the whole of Paris; during this last summer, on five distinct occasions that city experienced heavy hail and thunder storms, giving conclusive proof of the inefficiency of the electric niagaras.

108 - An Application of the New Pedological Knowledge to Grasslands.

SMITH, W. G. and CRAMPTON, C. B. The Influence of Origin and Topography on Grasslands. — *British Association for the Advancement of Science. Dundee: 1912. 30 M (Agriculture), m 13. London.*

This is one of the first applications of the new pedological and ecological knowledge to agriculture in Great Britain.

The extent and distribution of grassland in each district of Britain depends much on the economic requirements, but the natural productive capacity is primarily determined by the nature of the soil and vegetation resulting from the past and present influences of climate, topography, and the distribution of rocks. Extensive tracts of existing grasslands have, under man's operations, replaced other types of vegetation, such as woodland, heath, moor and marsh. Such grassland is liable to change, since it is only a phase introduced into the history of the vegetation. Other areas of grassland are of natural origin, and remain relatively constant under conditions which alter very slowly.

Grasslands may be grouped into :

- | | | |
|--------------------------|---|--|
| 1) natural | { | a) stable |
| | | b) migratory according to its natural origin |
| 2) artificially induced. | | |

The area of stable grassland in Britain is limited, e. g., chalk downs, exposed hills and bosses of limestones and basic igneous rocks. The migratory types are widely distributed on alluvial areas and rain-washed slopes along the river and coastal belts, and on the flanks of mountains. The changes which lead naturally to the evolution of grassland, and changes leading to its retrogression, are therefore factors to be specially considered where maintenance or improvement of grasslands is wanted. It is suggested that these conditions, taken in conjunction with variations on experimental plots, may aid in correlating information of different types of grasslands.

The stable types of grassland apparently owe their existence to the nature of the rocks and to the physiography, which limits the growth of grasses and prevents leaching of the surface and stagnancy. Apart from the stable types there are the migratory types mentioned below :

- a) Flushing of the slopes of moorland hills with water derived from springs, or with water bearing rain-wash, is favourable to the formation of grassland ; this is specially developed where the rocks are rich in lime or other bases, and where the flushing is temporary and periodic.
- b) Recent deposits of alluvial clay loams in the higher parts of stream-courses support types of grassland.
- c) Other types are formed on the alluvial clay loams of the flood plains in the lower reaches of river courses.
- d) Maritime types occur in succession to salt-marsh on coastal flats, and also on steep contours exposed to wind, salt spray and earth-creep, and where the nature of the soil prevents rapid leaching and the formation of heath.

The following conditions lead to the retrogression of grassland :

I. — In moorland districts, invasion by acid, humous, and ferruginous waters leads to deterioration, and in the case of alluvial sandy soils to the formation of pan and consequent stagnation and reversion to moorland.

II. — Continued leaching by rainwater removes the soluble salts from the upper layers of porous sandy loams and leads to production of heath.

III. — Alluvial grasslands and those of moorland flushes deteriorate by leaching when flooding is prevented ; the low-lying clay loam soil suffers mainly from insufficient drainage.

IV. — Accumulation of humus because of acidity or insufficient drainage discourages the more valuable grasses.

V. — Grasslands may suffer depletion slowly through the continuous removal of wool and carcase.

109 - Rate of Movement of Nitrates in the Soil.

MALPRAUX, L. and LEFORT, G. (Ecole d'Agriculture du Pas-de-Calais). La circulation des nitrates dans le sol. — *Annales de la Science Agronomique*, Year 29, No. 4, pp. 258. Paris, October 1912.

Six wooden boxes of 50 cm. cube were filled as follows:— 1) and 2) with sand containing 13.5 % of water, 3), 4), 5) and 6) with a loamy soil containing 16.8 % of water. Both soil and sand were tightly packed down. In 1) and 3) 10 gr. of calcium nitrate were put into a hole, 10 cm. in diam. \times 3 cm. deep, in the middle of the box. In 2) and 4) 10 grams of sodium nitrate were similarly placed. 5) and 6) received respectively 20 gr. of calcium nitrate and 20 gr. of sodium nitrate in a small furrow 2 cm. deep and 40 cm. long running parallel to the side of the box and about 5 cm. away from it. This side, in the case of 5) and 6), was also perforated by three rows of holes at 5 cm., 10 cm. and 15 cm. from the surface, the holes being 5 cm. apart in the rows. The holes were fitted with corks, and being 2 cm. in diam. allowed the use of an augur of 1.5 cm. diam. to be introduced for sampling. Though the boxes were kept in a place with little ventilation, in order to reduce evaporation it was found advisable to spray them with 2 litres of water each (equivalent to 0.31 in. of rain) after the experiment had been running 65 days. Samples were taken at 5 cm., 10 cm. and 15 cm. from the deposited nitrate both in vertical and horizontal directions. The Grandval and Lalande method was used for the analyses and the results are given in Table I.

Under the above conditions diffusion is evidently extremely slow. Even after four months the distribution of nitrate in the sampling squares is very unequal, the inequality being greater in the soil than in the sand. Vertical diffusion does not appear to be more rapid than lateral.

A second series of experiments was carried out in the field. A light loamy soil was selected and a strip of land marked out into 10 squares each 75 cm. \times 75 cm. In the centre of these a hole was made with an iron peg and a charge of sodium nitrate introduced to the required depth by means of a glass tube. The hole was then filled up again with sand.

Plots	1 and 2 were controls.				
"	3 and 4	received	100 gr.	of nitrate	at a depth of 1 m.
"	5 and 6	"	75	"	" " " 75 cm.
"	7 and 8	"	50	"	" " " 50 "
"	9 and 10	"	25	"	" " " 25 "

The surface of even-numbered squares was consolidated as far as possible, while the odd-numbered plots were hoed. Samples were taken from the surface with an augur, 8 cm. deep and at a distance of 5 cm. from the centre; they yielded the results shown on p. 190.

Plot		Nitrogen in milligrams per 100 dry soil			
		July 13 *	July 24	August 13	Aug
1 hoed	control.	5	7	6	
2 rolled		5	6	6	
3 hoed	1 m.	5	7	6	
4 rolled		5	6	7	
5 hoed	75 cm.	5	7	10	
6 rolled		5	10	13	
7 hoed	50 cm.	5	7	82	
8 rolled		6 *	8	90	
9 hoed	25 cm.	5	18	18	
10 rolled		5	30	27	

(*) Experiment begun on this day.
Total rainfall during experiment = 1.47 in.

Though the movement of nitrates by diffusion alone would be a very slow process, the state of things is evidently very different when they are caught up by the capillary current. In 31 days the nitrates deposited at 50 cm. from the surface had reached the sampling point or in other words had travelled over 40 cm., while by diffusion it would hardly have travelled over 4 cm.

Between August 25 and the end of October, 5.45 in. of rain fell on Oct. 25 fresh samples were taken every 10 cm. in depth to examine the distribution of nitrates as affected by the rain. The analyses are in Table III.

The rain had washed down the nitrates 20 to 30 cm. on the plots owing to their good absorbing surface, and there was a zone of maximum nitrate content for each original depth of nitrate. On the plots there was a second zone of maximum nitrate content nearer the surface, corresponding to the limit of penetration of the rain. On the whole the nitrates were at a higher level in the soil at the end of the season than at the beginning.

Practical conclusions. — When manuring beets, or other deep-rooted crops to which it is usual to apply heavy top dressings of manure

TABLE III.

Nitrates as Nitrogen in milligrams per 100 dry soil.

Depth	Controls		1 m.		75 cm.		50 cm.		25 cm.	
	Hoed	Rolled	Hoed	Rolled	Hoed	Rolled	Hoed	Rolled	Hoed	Rolled
	1	2	3	4	5	6	7	8	9	10
.....	0.7	0.6	0.6	0.5	1.1	1.0	1.3	0.8	0.8	1.1
.....	0.6	0.8	0.7	1.0	1.2	1.6	1.0	0.8	0.9	0.8
.....	0.8	0.8	0.8	2.3	1.3	4.4	0.9	5.6	1.0	6.8
.....	0.8	1.0	1.8	1.5	3.2	7.3	2.4	9.8	5.0	3.2
.....	0.6	0.7	1.1	1.9	7.4	4.6	4.3	9.7	5.1	3.2
.....	0.3	0.2	1.2	1.9	4.3	7.8	3.3	8.1	—	—
.....	0.1	0.1	1.9	2.0	7.2	4.9	2.2	1.6	—	—
.....	0.1	0.2	2.0	1.7	5.2	5.3	—	—	—	—
.....	0.2	0.2	1.3	1.2	—	—	—	—	—	—
.....	0.1	0.1	1.2	1.0	—	—	—	—	—	—

results would probably be obtained in many cases if the nitrate were applied by an early ploughing or applied very early in the year, for in dry weather the nitrates must often remain quite at the surface and out of reach of the roots. Should they be washed a little too far, they could probably be brought to the root region again in a short time.

Recent Researches on the Accumulation of Nitrogen in the Soil by Micro-organisms.

MAK, J. Studien über die Stickstoffanhäufung im Boden durch Mikroorganismen der chemisch-phys. Versuchsstation der böhm. Sekts. des Landeskulturates für Böhmen an der k. k. böhm. Techn. Hochschule in Prag) — *Zeitschrift für das landwirtschaftliche Versuchswesen in Oesterreich*, Year XV, Part 9, pp. 1077-1121 + 1 diagr. 3, Vienna, September 1912.

The writer considers the fixation of nitrogen in the soil by micro-organisms as one of the most important questions connected with plant nutrition. In three series of researches he investigates some of the principal factors of the phenomenon.

1. *Effect of some vegetable substances upon the assimilation activity of bacterium chroococcum Beijerinckii*. — It is well known that carbon dioxide is supplied to assimilating bacteria with the necessary energy. Examining, in nutritive solutions, with some vegetable substances, it was frequently found that they come into contact with the soil and com-

hydrates which may be utilized by bacteria, the following results obtained in comparison with glucose.

Vegetable substance	Carbon percent	Atmospheric Nitrogen and lated. N & P 100 g of of Carbon
Spruce needles	61.32	57.3
Oak leaves	55.24	89.5
Sycamore leaves	56.89	126.4
Maize leaves	49.03	280.3
Lucerne (green)	48.28	319.5
Wheat straw	51.04	325.4
Stubble	48.33	596.8
Lupins (green)	50.71	711.5
Clover (green)	49.67	1237.0
Glucose	39.97	1456.5

The chief conclusion to be drawn from these data is that the vegetable matter, the richer it becomes in ligno-cellulose and quently less adapted as nutriment for the azotobacter. On the other green stuff, and in a lesser degree roots and straw, contain substances which are easily hydrolysed into forms adapted to consumption by bacteria. There are further other micro-organisms in the soil which provide nutritive material for azotobacter, and there is a whole series of enzymes that render carbohydrates soluble.

2. *Effect of some energy-producing materials on the activity of organisms in the soil.* — Several samples of a beet soil were treated with energy-producing materials, and the activity of the micro-organism determined as a function of the intensity of respiration measured by amount of carbon dioxide given off during 21 days.

Energy-producing materials	Carbon dioxide mg. average per 24 hours	Percent of Carbon transformed Carbon dioxide
Soil	19.7	—
Soil + 10gr. carbon as glucose	755.4	42.14
" + " " " levulose	494.9	27.22
" + " " " starch	526.1	29.08
" + " " " cellulose	225.2	11.77
" + " " " oak leaves	328.7	17.70
" + " " " wheat straw	273.6	14.54
" + " " " clover (green)	1061.9	59.59

These determinations lead to the practically important result that of all the substances tried, green stuff is the best nutritive medium for the development of bacteria; in it they find, in favourable proportions, carbon, hydrogen and nitrogen; besides, the carbohydrates are more easily transformed by the enzymes contained in it.

acteria themselves. Consequently green manuring increases the ty of bacteria, it causes a more intense respiration, it raises the nature of the soil, while the greater development of carbon dioxide ns the porosity of the soil and in union with water facilitates the egration of insoluble phosphates and silicates.

3. *Soil biological absorption.* — In the economy of fertilisers in the absorption phenomena play an important part:

- a) physical absorption,
- b) chemical "
- c) biological "

The first two are fairly well known, not so the third, in virtue of which substances that constitute the food of plants are retained in an ord form by micro-organisms. The writer defines the biological ab-on of nitrogen as the difference between the amount of nitrogen bed by a sterilized soil and that absorbed by a non-sterilized one, s the quantity of nitrogen that is retained by the vegetative and ass-ing activity of the micro-organisms in the soil. The following data hanacteristic: they were obtained by percolating during 30 days c. of decinormal solutions of ammonium sulphate, of sodium nitrate of calcium nitrate through 250 grams of soil:

Nature of the soil	Humus: per cent. dry matter	Nitrogen absorbed: per cent. of nitrogen in			Carbon dioxide given off in 21 days mg. per 1 kg. of soil
		ammonium sulphate	sodium nitrate	calcium nitrate	
loam, neutral-acid . . .	3.27	10.23	5.12	4.02	30.6
sandy loam, neutral . . .	2.20	14.10	7.60	6.30	42.5
clayey loam, slightly al- ine.	2.45	17.22	9.21	7.14	45.4
l. loam, acid	7.52	8.81	3.98	3.20	28.6
ow, sandy loam, acid . . .	2.05	5.62	2.20	1.83	25.2

Practical conclusions:

1. — The biological absorption of ammoniacal nitrogen is much intense than that of nitric nitrogen.
2. — In biological absorption the behaviour of sodium nitrate is ar to that of calcium nitrate.
3. — There is a connection between biological absorptio and ion of the soil. The absorption of nitrogen is less reaction than with a neutral or alkaline one.

4. — The production of carbon dioxide is an index of the biological absorption of the various soils.

It thus remains demonstrated that biological absorption is an essential factor in the assimilation of inorganic nitrogen in the soil.

111 - The Action of Quicklime on the Soil.

HUTCHINSON, H. B. in *British Association for the Advancement of Science*, Dec. 1912. Section M (Agriculture), m. 5. London.

This paper gives an account of experiments designed to show how far the micro-organisms of the soil are affected by applications of quicklime.

The addition of small quantities of quicklime to field and garden soils stimulates general bacterial growth, but large quantities cause an initial depression in the numbers of bacteria and the destruction of certain large protozoa, and a cessation of all biological processes. Conversion of the lime from the caustic form into the carbonate, or combination with soil compounds, is followed by a great increase in the number of bacteria and increased ammonification of soil compounds. The length of the period during which the bacterial growth is suspended would appear to be determined by the quantity of lime applied, the initial reaction of the soil, and the amount of organic matter present.

Pot experiments have been carried out with variously limed soils, and the crop results show close agreement with those obtained by biological and chemical analyses.

112 - The Original Chemical Composition of Peruvian Guano.

El suelo y las plantas. IV. Composición del guano de la islas. — *La Riqueza Agrícola*. Vol. I, No. 10, pp. 643-649. + figs. 6. Lima, October 1912.

From the report furnished to the "Compañía Administradora del Guano" (3rd memoir) by the engineer, Sr. J. A. Lavalle García, we are in possession of the following data respecting the original composition of Peruvian guano and the nature of the deposits of this substance which occur on islands off the coast of Peru.

The composition of Peruvian guano is very variable, and depends on the following factors:

- a) The species of birds which produce it.
- b) The geographical situation of the deposits.
- c) The period of its formation.
- d) The depth of the strata used.
- e) The feather content.

Species of birds producing guano. — In spite of the resemblance between the food and in the digestive system of the birds (1) which produce guano



In the illustrations, the Alcatraz is a species of Pelican, the Guanaco is a species of Albatross. (E4).

position of their excrement is not identical, as might have been expected; this is shown by the following comparative table:

Chemical composition of the excrement of the chief guano-producing birds, per cent.:

	Alcatraz	Guanay	Piquero
Water	14.57	18.95	5.58
Substances insoluble in acids	0.39	0.47	2.49
Substances soluble in water	27.46	36.06	72.70
Chlorine	38.86	44.96	15.40
Chlorine reckoned as sodium chloride	0.54	0.10	0.35
Ammoniacal nitrogen	0.89	0.17	0.58
Organic nitrogen	15.54	11.76	5.46
Nitric nitrogen	12.18	8.12	2.02
Ammoniacal nitrogen	3.22	3.50	3.30
Nitric nitrogen	0.14	0.14	0.14
Phosphoric acid	10.15	13.10	5.75
Sulphur	0.67	1.94	2.07
Total	9.16	13.16	7.20

These data show the superiority of the guano from "guanais", which is further confirmed by the nature of its nitrogen content:

	Alcatraz	Guanay
Organic nitrogen	78.38	69.05
Ammoniacal nitrogen	20.72	29.76
Nitric nitrogen	0.90	1.19
Total nitrogen	100.00	100.00

Geographical situation of the deposits. — The richness of guano in Peru varies according to climatic conditions and consequently according to the geographical situation of the deposits; thus, the guano on islands north of Callao is poorer in nitrogen and richer in phosphoric acid than that of the islands lying to the south, on account of the rainfall, which occasionally causes a loss of nitrogen. The respective amounts are as follows:

	Nitrogen per cent.	Phosphoric acid per cent.
Lobos Island	10.80	27.69
Guañape "	10.95	28.00
Macabí "	10.90	72.60
Chincha "	14.20	24.10

Method of formation. — As time goes on, the guano deposits become poorer, especially in nitrogen, either on account of the rain-producing processes, lixiviation and volatilization, or of wind, which removes the finest particles.

From experiments made at the Sugar-Cane Experiment in Lima, it appears that the losses of nitrogen undergone by guano exposed to the weather are as follows:

	After 10 days	After 30 days
Rich guano	10.44 %	11.94 %
Poor guano	8.00 %	8.00 %

Depth of the layers. — The nearer the layers are to the ground, the more pebbles and sand and the less active organic matter they contain.

Feather content. — The feathers in guano are from their nature rich in nitrogen; their average composition is as follows:

	Per cent.
Nitrogen	14.00
Phosphoric acid	2.64
Ash	7.84

In order to make the guano more homogeneous, the large lumps are removed by means of sieves.

These data respecting the natural conditions of the guano do not reveal the very variable composition of this fertiliser, and assist in estimating the differences in it; thus the amount of nitrogen, which is the principal element in guano, utilized by the plants can be calculated.

	Per cent. of total nitrogen
Organic nitrogen	55
Ammoniacal „	30
Nitric „	1

The total utilization is thus 86 per cent.; if the losses due to the weather are taken as 10 per cent., and those occasioned by leaching as 5 per cent., the total amount of nitrogen used by the plants would be 71 per cent.

113 - Philippine Guano.

COX, ALVIN, J.: *The Philippine Journal of Science*, Vol. VII, No. 3, pp. 195-199, 1912.

The phosphatic guanos of the Philippine Islands consist of the excreta of sea fowl and other birds, bats and marine animals, with or less bone and animal matter furnished by dead bodies, and are found in large quantities in some places, mainly on small islands and in numerous limestone caves. That from caves is usually bat excrement. Deposits of guano have been discovered on a great many of the islands, and among them are Marinduque, Guimaras, Luzon and Mindoro. Some of the caves consist of one or more thousands of

bly as yet not over 1000 tons of guano have been mined in the whole pelago.

The writer summarizes in a table the results of 55 analyses of Philippine guanos executed by the "Bureau of Science." The following are the maxima and minima:

Guano	Nitrogen	Nitrogen as Ammonia (NH ₃)	Phosphoric Acid (P ₂ O ₅)	Total potash (K ₂ O)
68.45	0.10-8.81	0.22-9.93	1.4-23.12	trace-9.10

The Presence of Arsenic in Plants.

DIX, P. and ASTRUC, A. La présence de l'arsenic dans le règne végétal. — *Journal Pharmacie et de Chimie*, Year 104, Series 7, Vol. VI, No. 12, pp. 529-535. Paris, December 16, 1912.

It is known, especially owing to the researches of A. Gautier and G. Bertrand, that arsenic is normally present in animals; but until now, it was known of the existence of this substance in plants.

The writers therefore undertook a series of experiments on the occurrence of arsenic in the latter. They analysed more than 80 plants, adopting the process employed by A. Gautier and modified by Bertrand.

The analytic results for each plant are given in a long table from which the following figures, referring to the most common plants, are taken:

	Arsenic in mgr. per 100 gr.	
	Fresh material	Dry material
Orange (pulp)	0.011	0.099
Tangerine orange (pulp)	0.012	0.085
Haricot beans	0.010	0.012
Chickpeas	0.009	0.010
Lentils	0.010	0.012
Dried peas	0.026	0.030
Beans	0.020	0.086
Celery	0.020	0.232
Lettuce	0.023	0.387
Potatoes	0.008	0.031
Chestnuts	0.005	0.011
Hazelnuts	0.011	0.011
Walnuts	0.013	0.013
Bananas (pulp)	0.006	0.033
Dates	0.012	0.017
Asparagus	0.010	0.075
Rice	0.007	0.008
Maize	0.030	0.036
Barley	0.050	0.050
Oats	0.050	0.050
Black truffles	0.020	

From the results obtained, the writers draw the following conclusions:

a) It seems that arsenic is of general occurrence in plants and therefore this element must be of importance for the activity of the protoplasm.

b) Even parasitic plants, not in direct contact with the soil, contain arsenic, which is indispensable for their proper development. Further, there is no relation between the amount of arsenic in the parasite and that contained by the host plant.

c) From the arsenic content of any given plant, it is not possible to deduce accurately the amount present in plants belonging to the same botanical group.

d) In any individual plant, the green parts contain more arsenic than those which are not exposed to the light.

e) One of the sources of the arsenic normally present in the organs of animals is the plants which have provided them with food.

115 - Mode of Action of Weak Solutions of Electrolytes on Germination.

MICHEELS, H. Mode d'action des solutions étendues d'électrolytes sur la germination. *Bulletin de l'Académie Royale de Belgique (Classe des Sciences)*, No. 11, pp. 753-765, Bruxelles, 1912.

The writer used wheat grains and the same apparatus as described in his previous papers (1). He started with a $\frac{N}{100}$ solution of potassium chloride, and measured the effect of adding chlorine, potash and hydrochloric acid to electrified and non-electrified solutions. He also used sulphuric acid, electrified solutions of copper sulphate, and finally a $\frac{N}{1000}$ solution of potassium chloride.

As a result of these experiments, the conclusion is reached that the effect, favourable or otherwise, of electrolytes on germination is due to a disturbed state of equilibrium of the solution — that is to the liberation of cations or anions — and not to the acidity or alkalinity produced by electrolysis. Further, it is suggested that the ill effects of the solution are caused by a colloidal precipitation within the root cells.

116 - The Chemical Composition of the Oat Kernel. Variety and Variation.

BERRY, R. A. The Oat Kernel. — *British Association for the Advancement of Science, Dundee, 1912. Section M (Agriculture)*, m 8, London.

This paper gives results obtained from an extensive series of over 700 complete analyses of the oat kernel extending over several years. The oats were grown at the Experiment Station of the West of Scotland.

(1) Action des solutions aqueuses d'électrolytes sur la germination. (*Bull. de l'Académie Royale de Belgique (Classe des Sciences)*, 1909, p. 1076). Action du courant galvanique sur la germination. (*Bull. de l'Académie Royale de Belgique (Classe des Sciences)*, 1910, p. 51). Action des liquides anodiques et cathodiques sur la germination. (*Bull. de l'Académie Royale de Belgique (Classe des Sciences)*, 1911, p. 391).

ditional College, on various farms in the West of Scotland, and, in 1911, in 1911 at a few centres in the South of England and Wales.

VARIETY. — By tabulating the grain of over a hundred varieties, relating to the percentage and weight of kernel, along with the chemical analyses, the writer has distinguished several more or less well-defined types:

The White Grains: 1) small grains with a thin husk, a high percentage of oil, and an average percentage of nitrogen; these are characteristic and include the old Scotch varieties with the new strains selected from them; 2) large grains fall into two groups, (a) a thick husk, percentage of oil, and high nitrogen, (b) a thin husk, a higher percentage of oil, and a lower nitrogen; 3) grains intermediate in character chemical composition include the bulk of the newer hybrid varieties.

The Black Grains: 1) small grains with a thick husk, low oil, and average nitrogen; 2) medium grains with a thick husk, high oil, and low nitrogen; 3) large grains with a thin husk and the richest kernel of the winter oats.

These are the winter oats. The reddish and yellow grains form the other groups. The wild oat surpasses all in richness of kernel.

VARIATION. — In this respect the results show that climate is the most important factor. Distinguishing characters associated with a certain climatic combination become greatly modified and, in some cases, are obliterated when the conditions are radically changed. Scotch oats grown in the South of England and Wales in the dry and warm summer of 1911 yielded grain of smaller and drier kernel, a thick husk, higher nitrogen, and lower oil and weight per bushel than grain grown in Scotland.

The cooler and more humid climate of the West of Scotland and longer maturation period produces in the grain the opposite tendency except in the poorer and drier localities. The average variation of grain of over 63 varieties grown annually from 1909 to 1911, under the extreme climatic conditions prevailing at the Experiment Station, is a comparatively small. The unusually warm summer of 1911, however, a slightly larger kernel with a thinner husk, slightly poorer in oil and richer in nitrogen than the grain of 1909-10, and would resemble the grain of the normal English summer.

Time of sowing and ordinary dressings of manures produce little effect on the grain. Soils rich in nitrogen produce grain richer in this element.

Foreign and Colonial oats are usually, but not invariably, small, thin husked, relatively rich in oil and nitrogen, and of low weight per bushel; as a rule they have a short maturation period.

OIL AND NITROGEN. — Micro-chemical tests show the oil to be located in the aleurone layer and the embryo. The latter contains from 10 to 14 per cent. of the kernel, and contains between 11 and 13 per cent. of the oil, and between 4.5 and 6.5 per cent. of the nitrogen. The whole kernel. The smaller grains of the same varieties contain

richer in oil but slightly poorer in nitrogen. Analyses made every 14 days during the formation and maturation of the grain show the oil to increase rapidly in the first half, then remain stationary, whilst nitrogen increases all through the period.

The results seem to show that the variation of the principal constituents of the oat kernel is greater than is usually supposed.

117 - On the Application of Precipitine Reactions to Seed Identification

ZADE. Die Verwendbarkeit der Präzipitinreaktion in der Samenprüfung. — *Finnische Landwirtschaftliche Zeitung*, Year 61, No. 23, pp. 807-810. Stuttgart, December 1, 1911.

The present methods of seed examination only determine in a limited manner the quality and source of the seeds: thus it is not possible to distinguish (without previous cultivation experiments) a winter from a summer wheat; nor an awned from an awnless variety. In the same way, the nature of the seeds of leguminous fodder crops is only ascertained and, then not with absolute certainty, from the impurities found among them. Relander (*Studien über die Verwendbarkeit der Präzipitinreaktion in der Samenprüfung, Abhandlungen der Agrarökonomischen Gesellschaft in Finland*, Heft 1: Helsingfors, 1911) has begun a series of experiments with the object of adopting the precipitine method for seed identification; this method is based upon the knowledge acquired respecting the immunity of animals to infectious diseases and which the writer briefly summarizes.

The blood of infected animals has a specific reaction, i. e. it gives a precipitate in the presence of a culture (filtered) of the bacteria which it contains, but none in the presence of a culture of other bacteria. These reactions the name of precipitines is given. Further, an animal is introduced into the blood of which the albuminoids of another species have been introduced, has the power of reacting in conformity with these (albumino-precipitines). Thus, a rabbit which has been inoculated with horse serum gives a precipitate (of albumino-precipitine) in presence of horse serum, but not in the presence of the serum of any other animal. This method, which is a very delicate test, has been adopted for recognizing the blood of different animals, and recently for discovering the difference in the albuminous substances of the lower and higher plants, and for determining the degree of affinity existing between different plants.

The manner of proceeding is as follows: A sample of wheat, for instance, is reduced to a fine powder, and treated with a given quantity of a physiological solution of sodium chloride. The extract is filtered and injected in small quantities repeated at fixed intervals (3 to 10 days) into the blood of the animal which is the subject of the experiment. Then a small amount of the blood of the animal is taken and freed from red corpuscles by centrifugation; the residue, called the immunised serum, is filtered till it becomes completely clear. On adding to the filtered serum some drops of the wheat extract which was used for the immunisation, a precipitate is obtained, which is not produced if extracts of other seeds have been prepared from other seeds. The reaction

specific and can serve as a diagnostic. The practical value, however, would be very small if this method only served as a way of distinguishing one species from another, since this is effected already by examination. Relander's experiments have shown the possibility of obtaining from precipitine reactions a greater amount of differentiation than is furnished by direct seed examination. He found that the reaction of a rabbit which had been injected with an extract of two-rowed barley reacted in the presence of a similar extract (the reaction being more energetic for the same variety than for different ones), while there was no reaction in the case of six-rowed barley.

It should be noticed that there is not always an agreement between serological affinity and bio-chemical homology, and that certain species are more easily identified by the bio-chemical method than others. Two-rowed barleys form anti-bodies much more easily than do six-rowed varieties. In only one case was there a similar reaction from two-rowed and six-rowed barleys. This, Relander explains as due to the fact that the two-rowed barley in question was the product of a cross with a six-rowed barley.

In the experiments made with red clover showed that the Relander method serves to distinguish Italian and American clover seed from French and Norwegian, but the two latter are indistinguishable from one another.

The writer mentions, in conclusion, that the results hitherto obtained give the hope that the precipitine method will prove a valuable assistance in seed identification.

In the Inheritance of some Characters in Wheat: I.

WARD, A. and HOWARD, G. L. C. (Agricultural Research Institute, Pusa) in *Memoirs of the Department of Agriculture in India (Botanical Series)*, Vol. V, No. 1, pp. 1-46. Calcutta, September 1912.

The results of hybridisation experiments carried out at Pusa during the years 1905-1912 are given. In all cases the work was started from pure lines, and the paper deals chiefly with three series of crosses with wheats:

Felted \times *Smooth Chaff*. — The felting of the chaff in the wheat is shown to be due to at least two kinds of hairs, each of which is controlled by a single Mendelian factor and is inherited independently of the

Red \times *White Grain and Red* \times *White Chaff*. — Red colour in wheat may be due to the presence of one, two or three independent Mendelian factors, each of which may be isolated and is capable of producing red colouration alone; but the shade thus produced varies. In the present study, the effect of two red factors combined in one variety was studied. Only one factor was found to occur in all the crosses between red and white chaffed wheats.

Bearded \times *Beardless and Black Awned* \times *White*. — The inheritance of at least two Mendelian factors in the beard was found.

demonstrated, and in future a sharp distinction will have to be made between wheats which are absolutely beardless and those with short awns or tips. Only one factor was found to occur in the difference between black awned and white awned wheats.

Less extensive investigations were also carried out on:

1) *The consistency of the grain*, by crossing a constant soft wheat with a constant translucent wheat. Consistency in this case appeared to be due to a single Mendelian factor.

2) *The shattering of the ear*, which appeared to be due to two Mendelian factors.

3) *The standing power of the plant*, by a cross between a well strawed well rooted wheat, and a strong strawed wheat with little rooting capacity. All possible combinations were found, and the prospect of obtaining a well rooted, strong strawed wheat in the future seemed favourable.

In none of the crosses was there any indication of dominance in the first generation, which in all cases proved intermediate.

119 - A Summary of Experiments in Barley Growing conducted in the Eleven Years 1901-1911.

HUNTER, H. in *Journal of the Department of Agriculture and Technical Instruction for Ireland*, Vol. XIII, No. 1. Dublin, October 1912.

The experiments were commenced in 1901 in Cork and Tipperary but the work was soon extended, and in time included all the best growing counties in Ireland. At first the size of the plots was two statute acres each, but after 1908 this was reduced to one acre.

Milling Experiments. — For a number of years the produce of various plots was malted by Messrs. Guinness, and a sample from each subjected to chemical analysis in their laboratories. The figures in all cases agree with those obtained by previous experimenters, the highest quality barleys being those characterised by a low total nitrogen content.

Results will be discussed in detail later when the question of yield and quality is reviewed. With regard to the weight of 1000 corns, assuming equal quality, large grains give better extracts than smaller ones, and in practice it is found that the former do not mature as readily nor to the same degree as the latter, and are in consequence rarely of such good quality.

Variety Experiments. — The varieties tested were:

a) Narrow-eared — Archer, Scotch Chevallier, Hallett's Chevallier, Old Irish Danish Archer.

b) Wide-eared — Goldthorpe and Standwell.

A summary of the results is given in the following tables:

Comparison of average values of Archer with other varieties.

	No. of Tests	No. of years	Yield * bush. sta.	Av. value p. acre ** in shillings	% difference in favour of Archer
Archer	67	8	11 12	182	8.3
Goldthorpe			10 4	168	
Archer	28	5		166	20.3
Goldthorpe			9 14	154	
Standwell			8 14	138	
Archer	25	3	11 14	179	11.0
Scotch Chevallier			10 15	163	
Archer	15	2	12 12	194	12.8
Irish			11 9	172	
Archer	11	1	13 5	201	16.9
Hallett's Chevallier			11 4	172	
Archer	28	4		190 ² / ₃	— 0.1
Goldthorpe				190 ³ / ₄	

Yield = quantity of saleable malting barley given in "barrels" = 16 stones =

xs.

* Value per acre = value of total crop, i. e. malting corn + screenings.

Comparison of average nitrogen content of Archer and other varieties.

	No. of tests	No. of years	% nitrogen in grain
Archer	66	8	1.53
Goldthorpe			1.52
Archer	24	4	1.56
Standwell			1.64
Goldthorpe			1.55
Archer	25	3	1.54
Scotch Chevallier			1.63
Archer	15	2	1.55
Old Irish			1.69
Archer	11	4	1.55
Hallett's Chevallier			1.66

Both for quality and yield, Archer heads the list, and the only objection that can be urged against it is its tendency to late ripening; this can usually be obviated by early sowing. In the broad-eared class Goldthorpe proved superior to Standwell and also to two other varieties of Goldthorpe raised by the Department. The comparison of Archer and Goldthorpe does not show marked superiority for either variety: in every year excepting 1901 the value per acre of Goldthorpe on one of the plots has exceeded that of Archer, but there is no official evidence to warrant the general statement that the former is superior to the latter on certain soils or districts than the latter. Goldthorpe is sometimes injured by its ears falling off the straw, to which defect

for this reason its claims to general recommendation clearly outweigh any that can be advanced in favour of Goldthorpe.

Pure Seed Raising Experiments.—These were originally started on account of the difficulty experienced in obtaining pure seed of the different varieties that were being tested. In 1904 it was decided that in the future the progeny from *single ears* was to be used, but to bridge the time which must elapse before a sufficient amount of seed could be produced from this source, "group selection" was practised, i. e. a small number of ears from each variety were selected, and the grain used for seed production. In 1906 a selection of Archer was introduced from Denmark, where many single ear cultures have been propagated, and set against the unselected Irish Archer which had been grown under the Department's supervision since 1904, and which was at least 94 per cent pure. In 1907 the "group selected" Irish Archer was tested against the Danish Archer, and in 1908 the "single ear" culture of Irish Archer was ready for trial. The following figures indicate the value of the selection-factor on the yield and quality of the barley crop:

		Yield		Value per acre	Nitrogen
		bks. sts.		in shillings	content
		—		—	%
1906	Irish Archer	11	12	174	1.52
	Danish "	12	9	185	1.46
1907	Irish Archer	12	2	187	1.55
	Danish "	12	7	192	1.56
1908	Irish Archer	11	2	188	1.44
	Danish "	11	4	187	1.48

The superiority of the Danish Archer, which amounts to 11s. per acre in 1906, is reduced to 5s. per acre in 1907 and to nil in 1908. These experiments suggested a further trial of the extent to which the choice of seed from one locality to another is beneficial. Danish Archer was freshly imported from Denmark in the spring of each year, and compared with Irish Archer and Danish Archer grown in Ireland since 1906, with the following results:

Year	Irish Archer		Danish Archer imported 1906		Danish Archer imported each year	
	Value per acre shillings	% N.	Value per acre shillings	% N.	Value per acre shillings	% N.
1906	174	1.52	185	1.46	—	—
1907	187	1.55	191	1.54	192	1.56
1908	188	1.44	184	1.43	187	1.48
1909	220	1.47	222	1.46	224	1.46
1910	159	1.55	161	1.54	159	1.53
1911	187	1.64	188	1.64	—	—

These figures leave no room for any conclusion other than that no difference either in yield or quality exists between Danish Archer seed in Ireland for one or more seasons and freshly imported seed.

The Cultivation of Rice in Java.

ROSE, S. V.: Studien über den Reisbau auf Java. — *Der Tropenpflanzer*, Nos. 9-12, pp. 1-484, 527-542, 581-591, 645-660. Berlin, Sept.-Dec. 1912.

This paper is the result of observations made by the writer in Java, of abstracts of recent publications on the subject, chiefly by the Government.

Importance of rice culture in Java. — The production of rice in Java is 5.2 million tons of paddy in 1909, but insufficient for the consumption of the country. The rice is distinguished by its good quality. In the western part of the Island, rice fields occupy the whole of the cultivated area both on the plains and on the mountain slopes, on which they are arranged as terraces and reach up to 3900 feet.

Rice is grown by the natives in small farms; only exceptionally, by Europeans, on large estates. The Government takes much interest in the progress of the cultivation of this cereal. Experiments on rice growing are conducted at several experiment stations, especially at the one of Tjikömöh to which a school of agriculture for more educated natives is attached.

Rice is cultivated in Java in two ways, either in "Sawahs" or "Tegalans." The first are terrace-like perfectly level fields, surrounded by dykes and irrigated artificially or watered only by the rainfall. They are broad and regularly shaped in the plains, narrow and irregular on the hill slopes; the tegalans are always on inclined and uneven ground, they are not banked round and are watered only by the rain. A distinction between dry and wet rice fields does not exist in Java, as the rains fall throughout the year; they are always abundant in the western part of the Island, but less so from May to August (that is during the eastern monsoon) in a part of the east of Java. About 2 per cent. of the "sawahs" occupy swampy lands or those situated on the shores of the lakes (Moeras-Sawahs). In 1909 in Java and Madura (not including the principalities of Djokjakarta and Soerakarta) the total area under rice was 6 106 418 acres, of which 3 556 378 ac. were irrigated sawahs, 1 530 ac. sawahs depending upon rainfall and 539 940 ac. tegalans. The moeras-sawahs occupied 117 572 acres.

Irrigation works. — The most important irrigation works and canals are constructed and are kept up by the Government or with its assistance.

Thus the "wadoeks" or reservoirs of rainwater arranged as terraces on the hill slopes in the residencies of Soerabaya, Rembang, and others were improved and are kept in repair by Government. The management of the secondary canals devolves on the communes of the farmers.

The lesser irrigation works and sometimes the principal ones are carried out in common by the inhabitants.

The canals are fed by small barrages across the rivers; they lead into lesser canals which convey the water to groups of rice fields, the number of which ranges from 3 to 20, but most frequently from 4 to 10, each of which is situated on a lower level than the preceding ones.

Irrigation experiments. — The irrigation water is almost the only fertilizer used in the rice fields. L. G. den Berger, chemist of the Department, conducted in the Tjikömöh Rice Experiment Station a series of accurate experiments on the distribution of the mineral matter dissolved and held in suspension in the irrigation water, on the quantity of it that were deposited and on their effect upon the crops.

As a result of this experiment he came to the conclusion that a good distribution of the water and of the fertilizers it contains, it may be advantageous to alternate the fields that are the first to receive water from the irrigation canals.

The excessive deposition of silt in the fields that first receive the water must be avoided, especially if it is calcareous, because it would diminish the permeability of the soil, or if too rich in organic substances, this would favour vegetative growth too much at the expense of yield.

Soils. — For the most part they are very clayey, deep, and of a fine and regular texture; they are poor in humus (rice fields rich in humus have frequently an acid reaction, which does not suit rice) and in this they are also frequently relatively deficient in phosphoric acid. Especially in the western part of the island laterite soils prevail. The alluvial soils of volcanic origin in the Passeroean residency, especially rich in apatite, are the best of Java and give very heavy crops. In central Java there are recent volcanic soils containing much potash and deficient only in nitrogen; when they are manured with sulphate of ammonia they give excellent crops.

Varieties and selection. — The earliest varieties mature within 4 to 6 months from sowing, the latest in six or seven months. Besides *Oryza sativa*, *O. glutinosa* is also cultivated; both of them possess many varieties, some being more suitable for growing in sawahs, others in tegals; some are bearded, others beardless, some early, some late. The Rice Experiment Station has isolated and cultivated experimentally 800 native varieties, the selection of which has been begun on the Swakara lines.

Rotation. — After the first rice crop (October to March), that during the west monsoon, if the rice field is irrigable the soil is left fallow for about a month, during which time the harvested paddy is dried and stored; then the field is again flooded and the cultivation of rice

may be grown on the same field for several years in succession. In the moist parts of western Java. At most, two crops may be obtained, but those varieties which require 7 to 9 months for maturing and yield three crops in two years are preferred for a better product.

West Java, especially in the Preang regency, the cultivation of rice takes place from time to time with the rearing of gold fish. Two months is sufficient for the fish to attain a marketable size.

During the east monsoon there is not enough water available, one part of the fields is put under rapidly growing dry crops such as earth nuts, arra groundnuts, soy beans, cowpeas, moon beans, several kinds of cucumbers (lombok), sweet potatoes, yams; and in the very dry districts, especially of eastern Java, a good deal of maize is grown, as well as millet, coix, etc. and, among the plants intended for sale, etc. Sometimes, after rice, the soil is left fallow for a few months and utilized as pasture for buffaloes and other cattle.

The crops which follow rice in the rotation, are arranged in the decreasing order of merit according to their property of oxidizing the soil and of preserving its fertility: Leguminosæ; other dry crops; fallow with grazing; fish rearing. Flooding the soil without any reason is absolutely to be condemned, also because it favours the growth of weeds, especially *Pontederina crassipes*. *Special rotations* are those where the cultivation of the sugar cane or of tobacco is much practised. After sugar canes, if there is sufficient water, the rice fields are immediately prepared; in the contrary case, which is frequent, Leguminosæ are grown for two or three months. Anyhow, by March or April the fields must be harvested to make room for the preparation of the next sugar canes, which are planted from April to July.

Cultivation in the sawahs. — The work of preparing the ground lasts about 50 days. Care is taken not to make the seed beds in too fertile soil.

The rice is sown 30 to 40 days before transplanting. Formerly whole ears were sown; now the sowing of the separated grains is preferred. The seeds that float on the water are discarded; the rest are left in water for two or three days, being kept in baskets in running water.

One pound of soaked rice is enough for about 8 sq. yds. of seed bed; 390 sq. yds. of seed bed are sufficient for one acre. The seed-beds are moderately irrigated or not at all. In the first case the seedlings are planted out 30 to 40 days after sowing; in the second sometimes as many as 100 days are necessary. The use of dry seed beds is continuous. Before removing the seedlings from the seedbeds these are well irrigated if they are dry beds; if, on the contrary, they are flooded beds the water is turned off. In western Java the seedlings about 16 inches high are tied into small bundles and a half or one third of their haulms are cut away. The seedlings are set mostly in rows in dry or almost dry fields. In the Preang regency two to four seedlings are planted in each hole; a group of two or three plants gives rise to 15 to 20 haulms. The distance at which the seedlings are set is 2 1/2 to 3 feet.

1) See MÜLLER, H. *Der Tabakbau in den Vorstedenlanden auf Java*. Year 15, No. 9. pp. 468-479. Berlin, 1911. See also No. 134.

from each other varies considerably. In the plains, varieties have a long period of vegetation and consequently freely tillering, are planted at intervals of 8 to 10 inches, while short-lived varieties that do not tiller much are planted at 5 to 6 inches apart; in the mountains, in poor soils, the intervals are still less.

In the first days after transplanting the rice is moderately irrigated after 15 to 20 days it is flooded. Shortly afterwards the first weeding is undertaken. Then for two or two and a half months about 4 inches water are kept on the land. In the second half of this period the second and last weeding is carried out, the water being turned off two days previously and admitted again two days after. When the ear begins to form the depth of the water is diminished, and when the ears begin to turn yellow the water is completely turned off.

Cultivation in the tegalans. — The rice is mostly cultivated together with other crops, bananas or herbaceous plants. In this case as many as three crops a year are harvested, for instance: maize, rice and sesamum. Tegalan are frequently used to begin the cultivation of land which up till then had been under bush. This is cut, allowed to dry and then burnt; the ground is broken up and sometimes divided into rough terraces to prevent too much earth being carried away by the rains. At the rains of the western monsoon, the rice is sown in holes. The second rice crop is about $\frac{2}{3}$ of the first, and the third does not always cover expenses. The poorest soils, after several harvests, are left to themselves for some years, during which they get covered with bush; the ground is then broken up again. In 1909 there were 2 712 500 acres of regulated cultivated tegalans, of which only 525 000 ac. under rice. The burning of forests followed by the growing of mountain rice (as it is still practised in Siam and in the Sonda Islands) is unknown in Java.

Harvest. — The rice is reaped very high, in two or three times, moving the ears singly by means of a special knife with a curved blade. The reapers are paid in kind, from $\frac{1}{25}$ to $\frac{1}{5}$ of the quantity reaped, most frequently $\frac{1}{12}$ or $\frac{1}{11}$; those who, besides reaping, have assisted in the preparation of the soil or in transplanting the seedlings, get from $\frac{1}{5}$ to $\frac{1}{4}$.

Successive operations. — When the rice sheaves are dry they are put in huts with interwoven bamboo sides and roof of alang-alang (*Imperata arundinacea*). After 40 days husking begins. For this purpose wooden mortars are used, and only the quantity consumed in the course of the day is husked at a time. In Java there are also mills for the mechanical husking of rice; most of them belong to Chinese. They are driven by water power and are of a somewhat primitive character. The rice mill which turns out has a good many broken grains and is not suited for the supply for which comes from the European mills in the neighbourhood.

The average yield of irrigated rice fields is about 7120 lbs. per acre, fields depending only on rainfall 4750 lbs. per acre, and upland 3560 lbs. per acre.

Diseases and pests. — "Omo poetih," which means white disease, kind of etiolation which attacks the seedlings in the seed beds and disappears on transplanting; it is caused by insufficiency of plant food by mouldiness of the seed beds; it is frequent but not very injurious. "Omo bang" or "mentek" appears only 40 or 50 days after going out; it is caused by *Tylenchus oryzae*, which attacks the roots. This disease is at present limited to the central parts of the island, and sometimes caused very considerable losses. The only remedy known is to alternate rice with dry crops.

The larvæ of *Schoenobius punctellus* devour portions of the internodes of the culm, which in consequence produces ears with no grains in

Leptocorisa acuta sucks the juice from the ripening grain and sometimes does much mischief.

In April and May at times a nocturnal insect, called by the natives "ang-sangit" appears in great swarms which would destroy whole fields if they were not controlled by the lighting of fires in which they burn their wings.

Among vertebrates, voles are the most injurious. Their numbers are kept down by protecting the great rice field snakes (*Python bivittatus* and *P. reticulatus*).

Among birds the most harmful are *Amadina oryzivora*, several species of *Munia*, etc. (1).

- The Cultivation of Rice with the Help of Machines.

ABN, F.: La culture mécanique du riz en Indochine. (2). — *Journal d'Agriculture tropicale*, 12th Year, No. 137, pp. 321-325. Paris, November 30, 1912.

The writer, in analysing the monthly reports of the Indo-Chinese growing Association, points out the importance of the results obtained in 1912 by M. Alazard, agricultural engineer, attached to the Association, after having shown the necessity of improving the plant used in the manual tillage of the soil, claims to have solved the problem of weeding by cutting the reeds under water by means of a mower. By sowing directly in the rice field, vigorous and fertile plants are obtained.

It has likewise been proved that machines can be used for ploughing in all rice fields, that is those exposed to flooding during several months, so that transplanting is not indispensable in order to obtain a crop. These two points are of capital importance, as well as the fact that reeds do not present an unsurmountable obstacle to the cultivation of rice and that the grower possesses suitable machines for their destruction. The advantage of this means is connected with the observation of certain physiological conditions of the existence of plants: when plants are mown, the crown and the roots are asphyxiated and die rapidly.

(1) See No. 27, B. Jan. 1913.

(2) See No. 1612, B. Dec. 1912.

reeds that are mown do not send out new shoots. These results, especially considering the conditions under which they have been obtained, are sufficient to encourage further efforts in the cultivation of rice with the aid of machines.

122 - Cambodia Soy Beans.

Soya de Cambodge. — *L'Agriculture pratique des pays chauds*, 13th Year, No. 116, p. 116, Paris, November 1912.

The Colonial Garden has lately had occasion to examine a sample of soy beans from Cambodia. This sample was analysed in the laboratory of the Chemical Service and found to contain :

Water	7 per cent.
Proteins	41.6 „
Fat	18.6 „

The fat content of this soy is rather high, the average being 17 to 18 per cent.

This soy, submitted to expert brokers, was judged to be of good quality and of easy sale. Cambodia seems capable of producing large quantities of this pulse. According to information received it is cultivated in Cambodia only for local consumption.

123 - Experiments in Growing Lucerne of Various Origins in Denmark

HANSEN, P. Dyrkningsforsøg med Lucerne fra forskellige Avlstæder. — 63 Beretning fra Statens Forsøgsvirksomhed i Plantekultur. — *Tidsskrift for Landbrugets Plan* Vol. 19, Part 3, pp. 377-411, Copenhagen, 1912.

Comparative experiments in growing lucerne of various origins were carried out between 1901 and 1907 on the experimental fields of the Danish Service for Plant Selection. These experiments were a continuation of a preceding series extending over the period from 1884 to 1899, and dealt with 40 samples from Hungary, 19 from Germany, 13 from France, 13 from Italy, 17 from Russia, 2 from Spain, 12 from America and 4 from Turkestan, altogether 128 samples grown in 610 plots.

From the results as a whole the following general conclusions may be drawn, taking into due account the conditions of Denmark.

Hungarian lucerne may be considered from the Danish point of view as the best and the safest. All the samples proved good, and with but slight differences. Its chief merits are its permanence and resistance to cold. The first cut gives the major portion of the yearly crop, but successive cuts yielding very little; in the year in which it is sown and in the succeeding one Hungarian lucerne is somewhat less productive than the other varieties.

German lucerne is mostly a hybrid of *Medicago sativa* and *M. falcata*. It is the best in the year in which it is sown and in the succeeding year it becomes less productive, possessing a low percentage of seed. When sown with Hungarian lucerne, German lucerne does not

is much at the first cut, but the successive cuts are somewhat more abundant.

French lucerne, according to the samples tested, was uneven, some good, but most inferior to Hungarian lucerne. The first year's crop of French lucerne was more abundant than that of the Hungarian, but its permanence was inferior.

Italian lucerne behaves like French lucerne, only its permanence is inferior.

Russian lucerne: the few samples tested gave good results for the first year's crop, but the yield diminished from year to year.

The samples of American, Spanish, and Turkestan lucerne gave scanty crops, showing themselves unsuitable to conditions obtaining in Denmark.

On the basis of the following general averages for Hungarian lucerne:

Yearly yield in cwt. per "Tondeland" = 1.362 acres.

I Year	II Year	III Year
64.65	89.54	154.49

Expressing the yield of the other varieties tested as percentages of the yield of Hungarian lucerne, the following comparative figures are obtained:

Origin	Crop		
	I year	II year	III year
Hungarian	100	100	100
German	102	92	89
French	102	96	97
Italian	104	96	90
Russian	94	83	69
American	45	19	67

These figures represent the suitability of the various lucernes to the climatic conditions of Denmark.

The Exportation and Importation of Clover and Lucerne Seed into Hungary in 1910-11 and 1911-12.

UDVARTY. Külkereskedelmi heremazforgalmunk kétévi eredményének összehasonlítása. — *Mezőgazdák*, Year IX, No. 22, p. 184. Budapest, November 30, 1912.

The production of clover and lucerne seed in Hungary differs according to the climatic conditions, and while almost none in abnormally dry years, the crop is lucrative when the season commences with abundant rainfall and concludes with a prolonged period of heavy rain. If the crop continues, the clover succeeds the better, while if the season is dry, the lucerne is the more satisfactory crop. After reserving seed for home use, the rest of the product is sold, and sometimes even some of that needed for sowing is made up by imported seed; this trade depends on the price of the crop.

commercial, agricultural and especially climatic. This is shown by following table for the commercial years of 1910-11 and 1911-12.

	Clover Seed.			
	Exports tons	£	Imports tons	£
Wet summer 1910 (Commercial year 1910-1911)	4 741	270 848	1 196	75 919
Dry summer 1911 (Commercial year 1911-1912)	2 320	138 298	2 026	138 285
Lucerne Seed.				
Wet summer 1910 (Commercial year 1910-1911)	648	43 889	332	25 295
Dry summer 1911 (Commercial year 1911-1912)	1,095	71 342	279	21 864

It is seen that the revenue derived from the export of clover seed (the imports having been deducted) during the wet year was £199,5 while in the dry year it was only £13. But on the other hand, the lucerne in the wet year fetched only £18 594, as against £49 478 in the dry year. The result is that the clover years are the most favourable for Hungary in the present case the net total revenue from clover seed in 1910-11 £212 689, as against £49 491 only from lucerne in 1911.

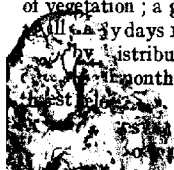
The statistics show that the export trade is greatest in autumn; the import before sowing. The Hungarian seed is sold after the harvest at from £4 9s. to £7 3s. per cwt., and before the time of sowing, foreign seed is bought at from £7 to £8 12s., the higher price the latter fetching being due to its greater purity.

125 - Cotton Growing in Louisiana.

SPAHR (Höfensholm, La). Die Zuckerrohr-, Baumwoll- und Reiskultur in Louisiana. B. Der Baumwollbau (1). — *Der Tropenpflanzer*, 16th Year, No. 11, pp. 591-607 + Berlin, November 1911.

Cotton growing began in Louisiana towards the end of the seventeenth century; Siamese white lint cotton was introduced in 1758.

Climatic Conditions. — Louisiana is now one of the principal cotton growing countries of the world, and this chiefly owing to its climate, relatively high temperature (from April to November: the lowest monthly temperature in November in Northern Louisiana being 74°, the highest, also in Northern Louisiana, in July, 34.3° C.); long period of vegetation; a good deal of sunlight (from June to September: complete 24 hours 19.4 in North Louisiana and 21 in S. Louisiana); regular distributed rains during the growing period (on average 4.1 inch per month from June to September) and dry weather during the



See on sugarcane see No. 128 below.

(EA)

Manuring.—It is often defective. Experiments carried out for 7 years in succession at the Baton Rouge and Calhoun Experiment stations have proved the necessity of completing organic manurials. The best results were obtained with 30 bushels per acre of compost consisting of 100 bushels of cotton seed, 100 bushels of manure, and 2000 lbs. of phosphate. At Calhoun, during the same period, this compost yielded an average of 1513 lbs. of seed per acre, whilst at Baton Rouge 1246.6 lbs., whilst the unmanured land yielded only 1000 lbs. per acre.

466 lbs. and 1034.3 lbs. respectively. The quantity of artificial gins cotton in Louisiana is trifling.

Varieties. — Early varieties are grown, especially short staple, small balled, Upland varieties. Long stapled early varieties (Sea Island) have been bred and the United States Department of Agriculture is endeavouring to introduce them, but their cultivation and harvesting are more difficult, and for ginning them special gins are required; further, they do not sell well on the local markets and they require continuous attention; for these reasons few planters care to grow them. The most widely spread varieties are the following:

- 1) Tooles Early Prolific. Short staple and small bolls. 87 bolls give 1 lb. of seed cotton. It is a low early bush, and it produces much seed cotton and lint.
- 2) King's Early Improved. Short stapled, abundant, seeds on long branches.
- 3) Simpkin's Early Prolific. Short stapled, somewhat early and more productive than the preceding, long branches, short internodes, seeds small.
- 4) Mebane's Early Triumph. Short stapled, large bolls. 50 medium sized. 46 bolls yield 1 lb. of seed cotton.

Many farmers in the north of the cotton belt use imported seed. It ripens earlier than the native seed but every two years new seed has to be imported.

In most cases the seed is taken from the ginning works. Most farmers get their seed from merchants or direct from the growers, especially in Georgia, S. Carolina and Alabama. Only a few of the large farmers produce their own good seed by means of selection.

Interculture. — The seeds are sown in rows as early as possible when no more frosts are to be expected (March-April). The quantity of seed is 1 bushel (30 lb.) per acre, though as experiments conducted in 1896 by the Bureau of Plant Industry have shown, 4 to 7½ lbs. of seed per acre are sufficient under favourable conditions to give a good stand.

The distance between the rows ranges from 3 to 5 feet and between the plants from 10 to 30 inches according to the soil and the variety of cotton grown. According to the writer the advice to plant at a greater distance apart is not sound beyond a certain limit, because formerly cotton plants continued producing buds till September and even October, whilst now the plants produce only up to the middle of August, because after this date the boll weevil prevents any further bud formation. Experiments carried out by the State Crop Pest Commission in the years 1906 and 1908 showed that close planting gave the best results, increasing the yield by 30 to 60 per cent. The most favourable distances

	Between the rows	Between the plants
On poor high land	3 feet	10 inches
On rich high land and good prairie soil	3 "	12 "
On poor or very sandy plain land	3 1/2 "	12 "
On well drained plains of medium fertility	4 "	15 "

These experiments showed also that in close planting the ants (*Solenopsis geminata*) played more havoc among the boll-weevil brood than heat or parasites.

A few days after sowing, the tilling of the soil begins again in order to get the surface loosened. At first the harrow is used and then the cultivator. Singling is performed twice, once when the plants are about 4 inches high and the second time when they are 12 inches high; after this they are slightly earthed up, and, weather permitting, the ground is worked once a week with the cultivator. At the end of July or beginning of August the soil is smoothed and thoroughly harrowed. Topping has been given up.

Harvest. — The harvest begins usually at the end of August and lasts to the middle of December. The quantity picked by one labourer in a day varies considerably. Some barely reach 100 lbs., others pick 300 to 400 lbs., first class pickers attaining 500 and 600 lbs. The cost of picking is about 75 cents (3s. 1d.) per 100 lbs.

The cotton is not dried before being ginned. Ginning is done in special machines which deal with at least 50 to 75 bales a day and in some instances as many as 250 per day. The cost of ginning a bale is \$2.50 (10s. 3d.). Only the best seeds are accepted. In 1906 there were upwards of 1500 ginning mills against 1200 in 1911. The seeds that are not used for planting are sent to the oil mills, of which there are about 50 in the State. **Yield.** — The average yield has increased somewhat of late years, and is only about 170 lbs. of lint per acre (in 1911 it reached only 143 lbs. per acre). With intensive farming and energetic control of the boll weevil it is possible to attain much higher yields, as is proved by statistics which show that as much as 356 lbs. per acre have been obtained.

Control of parasites. — The boll weevil appeared for the first time in the State at Monclova in Mexico, where in 5 five years it played such havoc on cotton growing that it had to be given up; in 1850 it reached Matamoros 10 years later the Rio Grande. In 1862 it appeared at Brownsville, Texas, and in 1903 in Louisiana. By the end of 1908 it infested the whole territory of the State. The harm that it has done may be seen from the following figures (next page).

For the direct control of the boll weevil, arsenate of lead sprays have been suggested, but owing to the difficulties attendant upon its use it has not become popular. On the other hand the practice of picking the infected bolls from the beginning of May to the end of June has become general. The bolls are placed in boxes covered with fine mesh, the meshes of which are wide enough to allow the weevils to escape but not the weevils. It would be of very little use if the

Year	Under cotton acres	Lint 500 lb. bal
1902	1 617 586	882
1909	930 000	253
1911	1 075 000	365

to destroy the cotton plants early in autumn, but few growers made their minds to do so. The utility of this measure, besides being proved by the experiments of the State Crop Pest Commission, has been shown by the immunity from the pest enjoyed by the plantations grown in localities in which the cotton plants had been destroyed by frost in the preceding year, as was the case in the northern parishes of Louisiana after the frost of 1907.

For destroying the plants at the end of the season some machines have been invented, one of the simplest of which consists of a cylinder of 18 inches diameter and 6 feet in length bearing sharp iron bars 1/2 inches broad and 1 1/2 inch thick. With this machine 10 to 12 acres can be cut.

Before the appearance of the boll weevil those varieties were selected of which ripened before the danger of frost was to be apprehended. Now early varieties are those that show first the signs of fruit buds. The signs of precocity are: low branches (the number of branches that do not bear fruit must not be more than four); short internodes; fruit branches at every internode of the main stem or of the side branches; continuous growth of the fruit branches, as the boll weevil attacks first the upper twigs and does not damage the bolls so long as there are available buds; the average breadth of the leaves for the plants of high lying lands must not be more than 6 inches and for the plains not more than 4 or 5 inches.

In selecting, the following points are also to be observed:

- 1) Size of the bolls (the larger bolls being easier to pick and giving greater resistance to bad weather).
- 2) High percentage of lint (38 to 40 per cent.).
- 3) Length of staple not under one inch.
- 4) Resistance to bad weather.

Cambodia Cotton in Bombay Presidency.

See *The Agricultural Journal of India*, Vol. VII, Part IV, pp. 373-381, 1912.

Cambodia cotton was introduced into the Madras Presidency through two independent channels in 1871.

in 1905 (1). In the Bombay Presidency it was introduced from the
 pine Islands in 1905, and from Tonking in 1906. Later on seed
 obtained from the Madras Presidency as well as from various other

es.
 Experimental trials were commenced in Gujerat, but the local con-
 s (a heavy black cotton soil and a rainfall of 36.33 inches) did not
 r to suit this cotton, which was then transferred to Dharwar in the
 of the Presidency, where it yielded promising results for a year
 o and then appeared to deteriorate as regards prolificness and re-
 ce to "red leaf blight" which attacks all exotic cottons at Dhar-
 On the contrary, good results were obtained in the south-east
 e Dharwar District, where Dharwar American cotton, introduced
 a century ago, had acclimatized itself, and is cultivated as a non-
 ted crop, being grown in the *rabi* season on the medium black soils
 own at the beginning of the monsoon on the red soils. Accordingly
 perimental farm was established at Gadag in 1908-9, with the primary
 of testing the suitability of newly introduced American and Cam-
 cottons and for comparing these with the Dharwar American.
 The results obtained — without irrigation — both on the farm and
 tivators' fields, prove this cotton to be well adapted for cultivation
 dag. The following table shows the results of comparative experi-
 with local saw-ginned Dharwar American.

Year	Yield per acre of seed cotton in lbs.		Ginning percentage		Remarks
	Cambodia	Saw-Ginned Dharwar American	Cambodia	Saw-ginned Dharwar American	
1910 ..	430	384	42.80	30.87	
1911 ..	410.5	221	38.30	30.70	A moderate season.
1912 ..	197	101	38.05	28.30	A very bad season.

The season 1911-12 was characterized by exceptional drought. The
 rainfall for the season amounted to only 13.77 inches, of which only
 n. fell after the crop was sown, against an average of 23.43 inches.
 theless the above results afford the proof that Cambodia cotton is
 right-resisting variety of exceptional capacity.

Cambodia cotton has spread rapidly in the Madras Presidency, where it suc-
 igation. It is distinguished for its vigour, high yield and good quality. In the
 sured land under irrigation the yield is usually stated to be from 1250 to 2500
 as and never less; while yields as high as 2500 lbs. have been reported. The gin-
 nage of 33 to 35 per cent. of lint. H. SAMPSON., The introduction of Cambodia
 dia cotton in the Madras Presidency. — *The Agricultural Journal*, Vol. 1, No. 1,
 V, pp. 365-368. Calcutta-London, Oct. 1911.

Cambodia cotton has further the following advantages over local saw-ginned Dharwar American: A higher ginning percentage; the seed cotton, being produced in large well-opening bolls, can be picked cleaner; the cotton is "bulkier," its colour is brighter and the staple more uniform, and lastly it is markedly resistant to "red leaf blight." At a sale by auction held in 1912, Cambodia cotton fetched 43 per cent more than the local variety. The spinning tests also yielded satisfactory results.

Among the sub-varieties of Cambodia, 102 B proved to be the best and the economic results that may reasonably be expected from it are given as follows:

	Cambodia 102 B	Saw-ginned Dharwar American
Cost of production per acre	18s. 8d.	18s. 8d.
Yield: seed cotton, per acre	310 lbs.	275 lbs.
Price of 1 lb. unginned cotton	1.85d.	1.42d.
Value of produce per acre	47s. 9d.	32s. 9d.
Net profit per acre	29s. 1d.	14s. 1d.

It would therefore increase very considerably the wealth of the district if the 200 000 acres annually devoted to saw-ginned Dharwar American were sown with Cambodia 102 B.

The writer concludes by demonstrating the necessity of continuing the selection of the Cambodia seed, so as to prevent any falling off in the qualities, of multiplying the selected seed on a large scale, and lastly preventing cultivators allowing this cotton to become mixed with local variety.

127 - The Improvement of Cotton in India.

The Bulletin of the Imperial Institute, Vol. X, No. 3, pp. 351-372. London, 1912.

During recent years the Provincial Agricultural Department of India have carried out experiments with a view to the improvement of indigenous varieties and the trial of exotic cottons.

Many samples of cotton produced in the course of these experiments were sent to the Imperial Institute, and the present article gives an account of the examination and commercial valuation of specimens from Madras, Central Provinces, United Provinces, Eastern Bengal, Assam and Burma (2).

Madras cotton. — One of the chief native forms of cotton cultivated in Madras is known as "Tinnevely." This really consists of a mixture of two varieties, "Uppam" a small balled variety of *Gossypium*

and "leaf blight" (Physiological Disease). This reddening, resembling rust, is most frequently toward the season's end and is most common upon the leaves due to lack of nourishment. Attacks of the mite cause a similar appearance. *Diseases of Economic Plants*, pp. 405-406. New York, 1910. (2)

and "Karunganni" a form of *G. indicum*. "Uppam" is grown in cotton soils in Coimbatore and Madura practically as a single crop. It is also grown mixed, usually with "Karunganni" and "Nallur" (a form of *G. obtusifolium*) in the east of Salem, south of South and north of Trichinopoly. It is also grown throughout the black soils of Tinnevely as a single crop or as mixtures containing as much as 5 per cent., the remainder being "Karunganni". The latter is also grown on red, mixed and shallow soils; it is a finer, and more even stapled cotton than "Uppam" and the Agricultural Department is endeavouring to extend its cultivation in Tinne-

velly among the exotic cottons which have been introduced, "Cambodia" (1) proved the most successful, and it is said that on irrigated land it yields four or five times the yield of the dry land indigenous cottons, the quality of the lint is satisfactory. In Tinnevely and Ramnad it is being sunk on a large scale with the primary object of growing cotton. The last crop was estimated at 33 000 bales of 400 lb., at £400 000.

A comparative examination of the Madras cottons carried out at the Agricultural Institute has shown that "Karunganni" approximates in size to Egyptian cotton (length from 0.8 to 1.1 in. and the average diameter 0.00074 in.) while "Uppam" has the ordinary coarse character of most Indian cottons (length from 0.9 to 1.1 in. and average diameter 0.00084). In other respects the "Karunganni" cotton is little if at all inferior to "Uppam". It yielded on ginning 28.1 per cent. of lint and 29.5; the weights of lint per 100 seeds were respectively 1.90 and 2.15. "Cambodia" is of very satisfactory quality (yielding 37.9 per cent. of lint or 6.89 grams per 100 seeds; length from 1.2 in.) and resembled samples of the same variety of cotton grown in America.

The Georgia Upland Cotton is of good quality (yield on ginning 35 per cent. of lint or 5.27 grams per 100 seeds, and length from 0.9 to 1.1 inches) but inferior to the acclimatised Cambodia cotton.

Samples of cotton from the Central Provinces.—The chief work of the Agricultural Department in the Central Provinces on cotton has been the selection of improved forms from the native races of cotton.

The cotton known as Berar "jari" consists of a mixture of a number of distinct races. Six of these have been isolated, and five of them, viz. *G. neglectum* var. *vera*, *G. neglectum* var. *vera* sub-var. *malvensis* (deep-lobed and narrow-lobed forms), *G. neglectum* var. *rosea*, and *G. neglectum* var. *rosea* sub-var. *cutchica*, have been grown experimentally in the Central Provinces. The *vera* and *malvensis* forms furnish the most productive but the coarser *rosea* and *cutchica* varieties yield a higher percentage of lint and would be the more profitable for cultivation in the Central Provinces.

Provinces. In the Tapti valley the finer types predominate; the in Berar, Wardha and Nagpur.

The variety of native cotton known as "Bani" (*G. indicum*) a fine silky staple, but as the yield per acre and the percentage are low its cultivation has been given up in favour of "jari." "jari" has been introduced and has done better than jari on certain rich lands. So far it has proved immune to wilt disease (*Fusarium* *sectum* Atk.) and is in demand where this disease is prevalent.

Experiments designed to ascertain the relative values of the out of the above mentioned cottons have been carried out at the Akola perimental Farm during several seasons.

The plants were grown on the deep black soil characteristic of cotton tract and were manured with cattle dung at the rate of 4 of nitrogen per acre. The results of the experiment are shown in the following tables:

	Average outturn of seed cotton per acre for four years	Percentage of lint 1910-1911	Average value for four cottons from 1910 for 1910-11
	lbs.		£ s
<i>G. neglectum, malvensis</i>	373	30.00	3 16
<i>G. neglectum, vera</i>	343	33.60	3 18
<i>G. neglectum, rosea</i>	402	40.00	4 13
<i>G. neglectum, rosea cutchica</i>	412	36.30	4 7
Berar "jari"	371	35.70	3 17
"Buri"	203	33.00	3 17
"Bani" (<i>G. indicum</i>)	255	29.00	2 18

These samples from Akola were of high grade for Indian cotton they were of somewhat inferior strength. With the exception of "chica" they were all of a much higher class than "superfine." growing of these cottons should be encouraged in preference to the ind "jari" varieties, which are now so largely produced.

Cottons of the United Provinces. — The chief cotton produced in the United Provinces is of a superior grade, known as Bengals. Several crosses have been made of this cotton which give promise of being a considerable improvement on the existing varieties, but none are quite satisfactory and production of some form of Upland would be advisable. The following are the samples received by the Imperial Institute for examination of indigenous varieties grown at the Government

Results of the examination of the samples of cotton received from the Akola Experimental Farm.

	•Bani- acclimat- ised •American Upland•	•Bani- (G. indi- cum)	Broad- lobed Malven- sis	Narrow- lobed Malven- sis	Vara	Rosa	Cutchica	•Jari- (G. na- gladum)
field co- or	30.8 to 33.15	25.15 to 27.5	28.2	28.45	33 to 33.7	40.35 to 40.6	34.8 to 38.5	32.1 to 37.8
er 100 grams.	3.4 to 3.9	1.60 to 1.85	2.2	2.4	2.36 to 2.9	3.25 to 4.3	3.03 to 3.4	2.3 to 3.4
of dia- meters	0.7 to 1.3	0.7 to 1.1	0.7 to 1.2	0.7 to 1.2	0.7 to 1.1	0.6 to 1.2	0.55 to 1.0	0.6 to 1.2
• diam- eters	0.00074	0.00069	0.00083	0.00083	0.00082	0.00088	0.00091	0.000815

nal Station, Aligarh. One, the white-flowered country cotton (Rui), yielded on ginning 40.5 per cent. of lint, or 3.26 grams per 100 seeds. The staple was short (from 0.5 to 1 in.) and coarse (average diameter 0.0009 in.) and the other, yellow-flowered country cotton (Rui), yielded 35.7 per cent. of lint, or 2.39 grams per 100 seeds, the length of the fibre varied from 0.6 to 1.1 in. and the average diameter was 0.00081 in.; this cotton is of good quality but somewhat deficient in strength.

Cottons from Eastern Bengal and Assam. — Cotton is grown on a commercial scale only in the Garo Hills and Chittagong Hill Tracts. In both localities the variety grown is *Gossypium arboreum* var. *assamica* Watt, the ginning percentage of the Garo Hill cotton is considered to be slightly higher than that of the other locality (50.1 per cent. against 48.5 per cent. in the samples examined at the Imperial Institute); the cottons of both samples were rough short (0.7 to 0.8 in.).

Cotton from Burma. — Experiments in cotton growing have been carried out at the Mandalay Agricultural Station, the work being confined at present to the trial of introduced cottons and the classification of indigenous cottons. The perennial or tree cottons have not been satisfactory. In the following table a summary is given of the results obtained in the years 1909 and 1910, together with the results of the examination at the Imperial Institute. The annual cottons were sown in rows three feet apart, without manure.

It would appear that the Egyptian varieties are less suited to the conditions of the localities in which the samples were produced than the American and "Cuban" cottons. All the samples, however, were of good staple quality, but with the exception of the "bani" cottons, which were rather lacking in strength and were slightly stained by the cotton-leaf beetle pests.

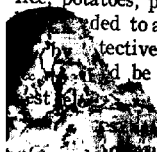
Variety	Yield of Seed cotton — lb. per acre	Per-centage of lint by ginning	Weight of lint per 100 seeds — grams	Length of fibre — inches	Average diameter of fibre — inches	Colour of
Abassi (first year) . .	416	30.5	3.6	1.3 to 1.6	0.00067	Cream
Abassi (second year) .	150	35	5.0	1.1 to 1.4	0.00066	Pale red brown
Mitafifi (second year) .	750	33	5.3	1.2 to 1.6	0.00065	Pale red brown
Cuban (new seed) . .	390	28.5	3.3	0.8 to 1.1	0.00086	Pale cr
Georgia Upland (new seed)	250	31.5	3.5	0.9 to 1.1	0.00074	Pale cr
Bani (first year) . . .	—	26.9	1.75	0.8 to 1.2	0.00068	Greyish
Cambodia	—	38.5	5.6	0.7 to 1.3	0.00073	Pale cr

128 - The Cultivation of the Sugar Cane in Louisiana.

SPAHN (Hohensolm, La). Die Zuckerrohr-, Baumwoll- und Reiskultur in L.
A. Die Zuckerrohrkultur (1). — *Der Tropenpflanzer*, 16th Year, No. 10, pp. 51
5 figs. Berlin, October 1912.

The yearly consumption of sugar in the United States is 80 ll head, being inferior only to that in England where it reaches 1 per inhabitant. The United States produce about one quarter sugar they consume, namely about 900 000 tons a year. Another q is imported from the American possessions: Hawaii, Porto-Rico the Philippines, and the rest chiefly from Cuba. Of the sugar pro in the United States about 350 000 tons are cane sugar, of which so Louisiana produces 325 000 tons (1910), which with the by-pro is worth upwards of £6 200 000.

Area of cultivation. — The chief area on which sugar cane is extends southwards from the confluence of the Red River along the bank of the Mississippi and its former emissaries. The breadth cultivated land varies from a few hundred yards to three English Behind the cultivated belt the wooded swamps, in which the drains are situated. The sugar belt comprises about one million acres of of which about 300 000 are yearly under sugar, and the rest under rice, potatoes, pulse, lucerne, etc. The cultivation of sugar canes is ded to about 9 millions of still virgin soils; on the other tective duties on sugar were abolished the cultivation of and be condemned to disappear; consequently the erect



of the article on cotton appears as No. 125 above.

ar factories and the increase of the area under canes proceed
rily.

eties cultivated. — 1) "Louisiana" or "Domestic" cane, with
and slanting leaves; it is suitable for clayey soils.

"Ribbon": red cane striped with white, slanting leaves,
istant to moisture and suitable to clayey soils.

"D. 74": dark green cane, erect leaves, high sugar content,
sistant to moisture and to drought, adapted to loose soils that
cake.

"D. 95": with purple epidermis and parenchyma, erect leaves;
on sugar content, but requiring a rich soil.

first two varieties, originally from Java, were introduced in 1820
replaced all other canes; the other two varieties were distributed
by the New Orleans Sugar Experiment Station, which had se-
them from a number sent by the Royal Agricultural Society of
ma. They are distinguished by their high sugar content and by
illering.

two first named sugars are either consumed as such, or together
96 per cent. sugar are sent to the refineries.

duction. — In average years the yield is about 31 cwt. of sugar
on light soils and 21.6 cwt. on heavy soils; in favourable years
lds rise to 48½ and 36.8 cwt. per acre respectively. In dry years
ount of canes harvested is lower, but they are richer in sugar than
years.

ost of production. — The cost of production is much higher in Loui-
than in the other sugar producing countries, being 3.75 cents,
d), while in Java it is 1.5 cents (0.73d.), in the Philippines 1.75
) and in Cuba 2 cents (0.98d.) per pound of raw sugar. This is
o the light harvests and to the high rate of wages, especially of the
ging staff.

is state of things, however, is improving in the sense of a greater
on of labour between the sugar cane farmer and the mill owners.

pest Pests. — Of late years the cane borers have caused much
ief, the loss amounting sometimes to as much as 25 per cent. of the

The causes of the increase of these insects lie in the imperfect
ion of the seed canes and in the neglect of the advice given by the
ana Sugar Cane Experiment Station to burn the infected parts
e destroy *Sorghum vulgare* and *S. halepense*, both of which are host
s of the cane borer.

Sugar Cane Cultivation and Sugar Industry in Peru for 1912. —
CARLOS ROMERO. Statistics for the Sugar Industry for 1912. — P. 100
IV, No. 8, pp. 424-429. Lima, November 1912.
The Section of Statistics, Direction of Agriculture
ry of Fomento and Public Works of Peru, of wh

the chief, has compiled the statistics of the sugar industry in Peru the year 1911. In the present paper the most important data are some of them being collected in the form of tables.

Sugar cane is grown in all parts of Peru where the climate is warm but its centre of cultivation is in the coast region. This coast region is practically a plain 1400 miles long by 30 or 40 miles wide and is formed by the erosion of the western base of the Andean plateau. Except in the extreme north, it is very dry, but it is crossed by some sixty valleys of great fertility.

The rivers which water these valleys bring down enormous quantities of water during the seasons of heavy rains and of melting snow. The greater number of them however almost drying up during the rest of the year. The overflow from these rivers has contributed to the formation of these productive lands, which are of an alkaline character, some of them containing a considerable quantity of chlorides, sulphates, carbonates, soluble in water. The lands where canes are cultivated are generally rich in lime, compared with the cane lands of other countries. Phosphoric acid is everywhere sufficient, as well as potash. There is plenty of nitrogen, but the quantity varies with each section.

Up to the present only three varieties of sugar cane are known in Peru, the white or yellowish white, the greenish yellow and the red or purple. Some foreign varieties have been introduced, one from Demerara and another from Hawaii, but neither seems to be superior to the native cane of Peru. The plant diseases are fortunately not very formidable and the only one worthy of the name is known as "barreno" or barrenness though it has not yet done any serious damage. In some valleys a cane borer has been found, which eats the leaves of the plants. Field mice do very slight damage. Among the accidents to which the cane is liable there are: falling down, to which the white variety is especially subject and early flowering.

The saccharine percentage of Peruvian canes may vary from 10 to 12; this is due principally to the methods of cultivation. Generally the sugar cane has much fibre, plenty of sugar and slight humidity. The juice is generally good and pure and it is readily manufactured. It is seldom necessary to refine the juices; the sugars produced are of a good colour, and a rather coarse grain, with high polarization and generally of easy crystallisation.

While in many districts from 18 to 24 months are needed for the cane to ripen, in other parts of the coast only 16 months are required. On some lands under favourable conditions, up to 90 tons of cane per acre may be obtained, and in some plantations an average of 60 tons and upwards may be obtained by intensive cultivation. At the present time the average production of good plantations is probably from 35 to 45 tons per acre. The following table gives a general idea of the average quality of the cane of Peru:

Saccharine matter	15.77 per cent
Fibre	15.00 "
Moisture	66.02 "
Density (Beaumé)	11.7
Brix	20.87 per cent.
Pure juice	89.68 "
Saccharine	18.72 "
Sediment	00.47 "
Glucose	00.45 "

sugar cane was introduced into Peru about the year 1570, and for time it was grown on a very small scale. The present sugar industry dates back thirty years. It is located chiefly in the coast region; production of sugar cane in the *sierra* and *montaña*, which is limited utility, is used largely for the manufacture of *chancaca* (an alcoholic sugar) and alcohol, which is totally consumed on the spot.

Early all the great sugar cane plantations have powerful mills, they not only grind their own cane but that of neighbouring plantations; sometimes they buy the sugar cane from those who have no mills, according to the quality and the price of sugar in the great centres, they grind the cane and receive from 30 to 50 per cent. of the sugar value therefrom.

Continuous cutting and grinding are possible in Peru.

The National Tax-Collection Company furnishes the following data of the sugar industry in Peru in 1911.

Exportation:

White sugar	91 819 cwt.
Granulated sugar	1 966 030 "
Syrups	374 680 "

Consumption of sugar:

White sugar	639 644 "
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Production of alcohol from cane:

Cane alcohol	1 361 729 gallons
------------------------	-------------------

The data collected and, for alcohol, partly calculated by the writer somewhat higher figures, namely:

Production of sugar	178 533 tons
" of alcohol	2 127 070 gallons

Two tables are annexed to the paper; they give the data concerning production of the various valleys of the coast belt. The following are the totals:

Cane ground	1 285 170 tons
White sugar	22 525 "
Granulated sugar	105 546 "
Syrups	21 926 "
Chancaca	1 000 "
Alcohol	78 000 "
Rum	4 000 "
Number of labourers	40 000
Average daily wages	25

130 - Seedling Canes in India.

BARBER, C. A. in *The Agricultural Journal of India*, Vol. VII, Part IV, pp. 39 plates XLI-XLVIII. Calcutta, 1912.

After comparing the respective advantages and disadvantages of the "vegetative" and of the "sexual" reproduction of cultivated cane the writer considers the economical value of the production, by means of seeds, of good varieties of sugar canes, especially of hardy and ductive varieties capable of resisting the diseases which are always appearing and becoming more serious, and of holding their own against the petition of sugar beets.

Experiments with the object of obtaining new varieties of cane were carried out in all sugarcane growing countries, especially in the Agricultural Departments in Java, the West Indies, British Guiana, the United States and Mauritius; but it was soon discovered that the great bulk of these seedlings were of inferior character, many appearing reverting to what one might suppose was the original wild form of the cane.

A long labour of selection became necessary. As an instance it may be mentioned that in five years in Barbados some 20 000 seedlings were raised and that less than 1 per cent. of them are likely to prove of any value. In the same time in British Guiana about 330 000 seedling canes were produced, and it is surmised that of the whole number perhaps a dozen may be added to the canes grown in the country.

In Java before 1850 there was practically only one kind of cane grown, the White Cheribon. In that year a planter noted a red cane among the rest: he separated it out and multiplied it. As it proved harder, more productive and provided with a richer juice, it rapidly replaced the older white cane in many parts of the island. In 1882, however, a planter in the extreme west of Java noted that his canes were stunted, developed many aerial roots and multitudes of side branches resembling the curious bunching growth frequently noticed in South India when the canes are irrigated with alkaline water or cropped several seasons without change of seed. Around Coimbatore this kind of growth is known as "shuleh kutteh" and in Java as "serah". In 1892 this disease had reached the extreme eastern point and entered the island of Bali. It was noted that ratoons were much worse affected than plant canes and that the fields in the hills were comparatively free from the disease. The old plantations were accordingly renewed with seed canes from the hills. It was estimated that in one year alone some £200 000 were lost to the island through the disease, and this when the crisis produced by beet sugar was beginning. In order to solve the difficulty several scientific sugar stations were founded to study the problem. They imported into Java canes from various countries, including the Indian variety called Chunnee. A number of these varieties proved to be more resistant to the disease than the

canes, but none were considered completely satisfactory. Recourse then had to the production of canes by means of seeds, the Indian one being largely used as a parent; and with good results. Besides disease-resistant some of the seedlings can resist drought, while some stand excessive moisture; some ripen early and others late, thus continuously supplying fresh canes during the whole of the milling season. As a result, it may safely be stated that the Java sugar industry is in a very much better position than it was before the appearance of the output having risen in 1911 to 1230 000 tons, placing Java only second to Cuba among the exporting countries.

The cane sugar industry in India is in an unsatisfactory condition. Some of the better-class canes are heavily diseased or, as in Madras, they are grown on a very small scale, and the hardier and more widely spread varieties are among the poorest in the world.

Consequently the improvement of the sugarcane by means of seedlings has an immediate practical importance. Experiments with this in view have been made in various localities in India; those carried out at the Samalkota sugar station in the Madras Presidency led to the selection (by seeds obtained from the cultivation of imported varieties) of good varieties; none of them, however, are really immune, and hardly are suitable for introduction into the large areas under cane in Northern India.

The writer has started at the College of Agriculture at Coimbatore work of breeding and selecting varieties of sugarcane, both local and imported from other parts of India, as well as the histological study of the reproductive organs. The canes flower very freely, but the formation of seed is comparatively rare. The writer has ascertained that this is due to the infertility of the anthers, which often do not open (1). In the varieties Java 36, Java 247, Chin, Desi Sarethia and Dhaula Sarethia he did not find any anthers open. In Striped Mauritius, Red Green sports from it, Barbados 1529, Fiji B, and Vellai he found 10.5 to 4 per cent. open, while in Red Mauritius, Cheni and Purple Mauritius the percentage of open anthers rose to 30 to 70 per cent. Of the varieties only one, the Cheni of Mysore, is a native of the country. Perhaps it is the same as the one which, under the name of "Chunnee", was imported into Java from India and extensively used as a parent in crossing experiments.

Owing to the prevailing infertility of the local canes, there is not much fear from self-fertilisation, and this facilitates the work of cross-breeding and selection. Both the Cheni and the Red Mauritius are in addition excellent canes in their way, more or less hardy and to a certain extent immune from local diseases; it is expected that they will be of great service in the production of new Indian varieties. The writer is now reporting upon the present state of the work of selection and cross-breeding which he has begun.

(1) See No. 1628, B. Dec. 1912.

131 - The Nitrogenous Constituent of Para Rubber and its bearing on the Nature of Synthetic Rubber.

BRADLE, CLAYTON and STEVENS, HENRY P. in *Journal of the Society of Chemical Industry*, Vol. XXXI, No. 23, pp. 1099-1103, London, December 16, 1912.

Gladstone and Hibbert were the first to indicate the nitrogenous character of the insoluble part of Para rubbers (those from *Hevea brasiliensis* which is left as a sort of network after solution of the hydrocarbon) (*J. of Chem. Soc.* 1888, p. 680).

The writers have shown that the insoluble matter derived from rubbers of various sources is highly nitrogenous in all cases, and contains up to 7 per cent. of nitrogen, and that the presence of nitrogen in the soluble portion only occurs in rubbers which have received some mechanical treatment; such treatment disintegrates the nitrogenous network.

Results with smoked sheet rubbers have already been given; in paper those from non-smoked rubbers and rubbers of sources other than *Hevea* are described.

A sheet of plantation rubber was cut into small pieces and allowed to soak in twenty-five times its weight of benzene; after several days the upper layer was carefully decanted and replaced by fresh benzene; after another week or two the clear upper layer was again decanted and added to the first portion and the rubber recovered by spontaneous evaporation. This rubber was of a pale golden colour. The lower portion of the solution containing the dark nitrogenous insoluble matter, was similarly evaporated, and gave a dark coloured rubber. It therefore appears that most of the colouring matter in dark rubber is due to the insoluble matter. The dark colour is brought about by the action of oxydases, it is probable that the non-caoutchouc constituents which are oxidised rather than the caoutchouc itself.

The following specimens were tested: 1) the rubber not treated; 2) a portion allowed to swell in benzene and then evaporated spontaneously; 3) the lower half of a solution in benzene containing the dark insoluble matter; and 4) the upper pale solution.

Analyses of the unvulcanised rubbers.

	1)	2)	3)	4)
Acetone extract per cent.	2.48	2.52	2.32	3.04
Nitrogen per cent.	0.475	0.462	0.840	0.070
Calculated as protein	2.97	2.89	5.25	0.44

These samples were masticated and vulcanized under uniform conditions as to contain 7 per cent. of sulphur. The sheeted compound was cured alongside one another in steam for three hours at a pressure of 15 lbs. per sq. in. (exclusive of atmospheric pressure). The steam pressure was ample for vulcanizing 1), 2) and 3); specimen 4) was subjected to the higher cures to find suitable conditions.

also are given of the vulcanized rubbers as well as a diagram of made in the Schwartz hysteresis machine. The breaking strain and ion were also determined.

Mechanical tests on vulcanised rubbers.

	1)	2)	3)	4)
Cure 3 hours at 35lb. pressure.				
Tensile strength . .	59	53	75	13
Elongation, per cent	910	950	840	710
Cure 3 hours at 45lb. pressure.				
Tensile strength . .	100	100	95	33
Elongation, per cent	740	780	600	1140
Cure 3 hours at 55lb. pressure.				
Tensile strength . .	50	—	—	41
Elongation, per cent	470	—	—	960
Cure 3 hours at 65lb. pressure.				
Tensile strength . .	40	—	—	30
Elongation, per cent	380	—	—	400

While it is open to question how far the quality of the rubber was im-
 ed by the presence of more than a certain proportion of insoluble matter,
 would appear to be little doubt that its removal resulted in deteriora-
 No. 4) is undoubtedly inferior; although 10 or 20 per cent. more disten-
 than the untreated rubber, its tensile strength (maximum only 40
 ent. of untreated rubber) and other physical qualities were strikingly
 or. Rambong and Ceara appear to behave similarly to Para, although
 ormer contains much less and the latter much more nitrogen.

Obviously synthetic rubber cannot contain any insoluble nitrogenous
 er of the character of that found in natural rubber, and to add it so
 obtain the reticulated structure would probably be impossible. It
 fore seems reasonable to expect that synthetic rubber would have
 the same properties as sample no. 4).

In previous experiments the writers have shown that the removal of
 greater part of the resins from the rubbers as Para grades and Ram-
 results in a marked deterioration, as shown by the difficulty in vul-
 ing and the lower figures obtained by the extracted rubbers. It would
 fore also be necessary to add resins to synthetic rubber; but the
 riments of Seidl show that not all resins have the desired effect.
 shlong for instance, being useless. Experiments by L. (of Lon-
 mal of the Society of Chemical Industry, 1912, p. 888) and of our
 observations of the writers as to the difficulty of the removal of the
 val of the resins,

132 - Contribution to the Study of Rubber in the North of Madagascar

HAMET, H. and JOSSE, L.: Contribution à l'étude du caoutchouc dans le Nord de Madagascar. — *L'Agriculture des pays chauds*, 12th Year, Noe. 115 and 116, pp. 265, 372-379. Paris, October and November 1912.

The rubber plants found in the north of Madagascar are numerous. Among *Landolphas*, *L. madagascariensis* is a liana of considerable size, up to about 100 feet, with a diameter at about 3 feet up of 4 to 5 inches. Its yield in rubber varies from 6 to 25 per cent. of the latex; the latex which is rose-coloured, soon turns brown on exposure to the air; the best yields are those obtained during the warm weather; the best rubber is had by tapping the stem and the adult branches. It is classed as one of the good average sorts and is worth about 60 per cent. of Para rubber.

Landolphia Perieri gives a rosy-white rubber, full of nerve and elastic, keeping very well, but the yield is very slight, varying from 1 to 17 per cent. according to the season.

L. sphaerocarpha, called "Reiabo" by the Sakalaves, yields an abundant latex containing from 18 to 26 per cent. of fine quality rubber. This liana is the most interesting among *Landolphas*, and in case of plantations the writers are of opinion that it is the one that ought to be cultivated.

"Lombiro" (*Cryptostegia madagascariensis*) yields a good quality latex with a rubber yield of 15 to 20 per cent., and great care is taken to coagulate the latex from the adult branches. It is a kind easy to propagate by cuttings, layering and seeds.

"Bokalahy" (*Marsdenia verrucosa*) yields abundant latex, worth from 10 to 12 per cent. of good rubber.

The various species of *Mascarenhasia* are called indiscriminately "Barabangas" by the natives. The rubber produced by these different species is the kind called "Black rubber of Madagascar," and is worth at 50 to 60 per cent. of the price of Para.

The distribution of these species is described in detail by the writers. "Lombiro" is found all along the coast on the dunes swept by the trade winds; the *Landolphas* grow under the shelter of the forests and on the edges of the wooded islands forming the great bush; the "Barabangas" seem to adapt themselves to the white quartz sands and cover the slopes of water courses and grow even in the beds of torrents. All these various rubber lianas are endangered by bush fires and by the violence of the waters; it would therefore be necessary to delimitate the areas most suitable to the production of rubber, and a good deal would have to be done to induce the natives to produce a better prepared rubber of constant quality.

On account of the high value of plantation products, it is especially to their cultivation that it is therefore necessary to increase the production and to encourage the natives to produce rubber. It is for this reason that the writers have followed the various traditions that the natives have followed in the collection of rubber, and have led them to introduce

surveillance, some modifications in their special technique, especially a view of making them :

- 1) Free the latex from the impurities it may contain.
- 2) Treat it immediately upon its extraction from the plant.
- 3) Disinfect it preliminarily, to ensure its preservation.
- 4) Use a coagulant to the required degree of acidity.
- 5) Filter the coagulant.
- 6) Use an excess of coagulant in the latex.

samples of rubber thus prepared by the natives were submitted to judgment of experts at Havre and Antwerp.

The following are the results of the comparison of the above rubbers Ceara plantation rubber, Java, Manihot and Ceylon Para.

	I Lombro — per cent.	II Landolphia — per cent.	III Ceara — per cent.	IV, Manihot — per cent.	V Ceylon — per cent.
sture	1.2	1.8	1.2	0.8	0.3
.	0.5	0.15	0.7	1.2	0.4
in	8.75	7.2	7.7	5.2	2.95
istance to heat: 10 hours at 70° C.	well preserved	well preserved	fairly well preserved	well preserved	fairly well preserved

The qualities I and II can thus bear comparison with the finest sorts second rate rubbers.

The writers explained also to the natives that they allowed an appreciable quantity of rubber to be lost by abandoning the branches that are and that by barking and pounding them, 100 lbs. of abandoned branches would yield 8 lbs. of rubber similar to the fine sorts called "Benas" and also "Mozambiques."

This system of extraction, which, in order to be productive, should be carried out by machinery, offers the great advantage of allowing the use of branches that would otherwise be wasted, of plants with thin stems and of those growing kinds for which this method is more advantageous than the present one.

In order to ensure the future of Madagascar from the point of view of the production of rubber the first thing to be done is to stop the extraction and destruction of the spontaneous indigenous plants of the country. The production of the country should be increased by the introduction of the best American plants should be introduced into the country. The latter, if properly cultivated, could give as much as 100, 337 and 1000 lbs. per acre.

with lianas, calculating on 400 plants per acre, one could not have than 107 to 116 lbs. per acre at the utmost. But the fact must be in mind that the experiments made of transplanting Heveas as Cearas and Castilloas have not yet given conclusive results and on the other hand the development of a plantation of indigenous rubber-bearing species in Madagascar seems likely to give good results.

133 - Rubber Examined at the Imperial Institute (1).

1. — Rubber from Ceylon.
2. — Rubber from Papua.
3. — Rubber of *Hevea confusa* from British Guiana.

Bulletin of the Imperial Institute, Vol. X, No. 3, pp. 380-383; 386-388; 3 London, 1912.

1. *Ceylon Rubber*. — At the Experiment Station at Peradeniya, Ceylon, a series of tapping experiments was carried out to determine the relative value of excision and incision methods as applied to *Hevea brasiliensis*, the tapping being performed 1) by the knife only (incision), 2) by the pricker only (incision) and 3) by a combined method using both the knife and pricker. The results of the chemical examination of the rubber which was analysed at the Imperial Institute, proved that the different methods were nearly equal. Two specimens obtained by making half-spiral incisions were practically identical, though the crêpe rubber from the third method was a little inferior to that obtained by the other two. The biscuit obtained by the third method was a little superior to that due to the first.

In 1906, several new rubber-yielding species of *Manihot* (*M. totota*, *M. heptaphylla*, and *M. piauhyensis*) were discovered in Brazil and were stated to be superior to *M. Glaziovii* and therefore introduced experimentally into a number of countries. In Ceylon, *M. dichotoma* was stated to thrive better than the Ceara tree (*M. Glaziovii*). Samples of rubber from young trees of the first species were prepared at the Experiment Station at Peradeniya and analysed at the Imperial Institute; the rubber in composition was of very fair quality (84.6 per cent of caoutchouc), although the percentages of protein (5.7), insoluble matter (4.3) and ash (2.9) were rather high.

2. *Rubber from Papua*. — The chief rubber-yielding plants indigenous to Papua are *Ficus Rigo* and a species of vine, which has so far not been determined. *F. Rigo* is a tree which is chiefly found in the northern district, where it is known by the name "Maki"; it furnishes much of good quality, which is collected by natives for export. Experimental plantations of this tree have been made in the island. The rubber obtained by the vine is also of very good quality.

For further information on this subject, see also: Colonial Reports, Miscellaneous Scientific and Technical Department (E.A.)

Rubber of Hevea confusa from British Guiana. — *Hevea bra-*
is not indigenous to British Guiana, but it has been introduced
for plantation purposes and promises to do well in the Colony. Several
species of *Hevea* are, however, natives of the above-mentioned
country, and of these the most widely distributed is *H. confusa* (Hattie
i). The rubber furnished by this plant has hitherto been regard-
ed as of little commercial value, but the present sample, which has
been analysed at the Imperial Institute, though deficient in elasticity
and tenacity, is of very satisfactory composition.

Caoutchouc	92.3 %
Resin	1.8 "
Protein	4.9 "
Ash	1.0 "

the yield per tree is small, even under cultivation, (British Guiana,
Java). At Buitenzorg, twenty-year-old trees, with a girth
of 40 to 50 inches breast high yielded only 0.35 oz. of dry rubber
per tree.

The Cultivation of Cigar Tobacco with Special Reference to Java.

*Bulletin of the Imperial Institute, Vol. X, Nos. 2 and 3, pp. 148-263 and 465-470,
London, 1912.*

The United Kingdom imported in 1910 no less than 111 257 544 lbs.
of manufactured tobacco, valued at £3 435 493, of which only 1 471 102
lbs. valued at £45 987, was derived from British sources (almost exclusively
from North Borneo, India and Jamaica). The writer is of opinion
that it would be desirable to extend the growing of tobacco in the British
Colonies; he considers the question under its various aspects and as a
contribution to its solution he gives an account of cigar tobacco culti-
vation and preparation as it is carried on in Java.

If the tobacco estates in Java are situated in the Vorstenlanden or
in the palatates (of Djocjokarta and Soerakarta or Solo) and are mostly
situated near Klaten in the principality of Soerakarta. The chief es-
tates subscribe a definite sum per annum to the Department of Agricul-
ture for the upkeep of the Tobacco Experimental Station at Wedi or of
the general Experimental Station at Salatiga, which includes a special
section with a laboratory at Klaten.

Land Tenure and Labour. — In the Vorstenlanden all the land is look-
ed upon as belonging to the King, and one-fifth of it is regarded
as pertaining to him personally. Part of the land is employed to meet the
administrative and other needs of the Government, the rest is let to
the use of the royal families or of the nobles. Part of the land is
let to the tobacco undertakers, who pay a fixed sum for the use of the
land, with certain rights to the tobacco produced. The land is
let to a tobacco undertaker, who pays a fixed sum for the use of the
land, the intermediary through whom the land is let to the tobacco

wide and 4 ft. deep); they are generally made in a new place every year. The land is then ploughed and manured and ploughed again twice, which a second system of parallel gutters is constructed. These gutters are 10 in. wide and 1 to 2 ft. deep and lie about 30 ft. apart, running at angles to the first set, which is made in the direction of the slope of the land. The whole field is then surrounded by a ring-drain. The land is thus formed are ploughed again three times. The land is then sown out for planting, pieces of split bamboo indicating the positions of the seedlings are to occupy, at intervals of 1 ft. 6 in. along rows.

At this stage the middle two feet of the three-foot space is worked by a pair of bullocks (a kind of broad mattock) to a depth of $1\frac{1}{4}$ to $1\frac{1}{2}$ ft.; the remaining 6 in. on either side of the bamboo marks is worked to a depth of 1 ft., except close to the bamboos, in order to allow the young plants to grow more firmly. Another method of working the soil consists in turning it up in strips and leaving the subsoil of each alternate strip to lie to the air for some time. Whichever method is adopted, on the whole the working of the soil is done with great care.

Manuring.—Practically the only manure used is street sweepings (poor) and the rice straw that is ploughed in. Green manuring is advantageous, but it cannot be carried out economically as the are already occupied almost continuously by rice or tobacco. The crop refuse is not used as manure because the commendable practice of burning all this refuse every year to avoid spreading diseases.

Seed Beds.—The seed beds are prepared in mid-July, end of July and August, so as to have tobacco in three stages of development. Soil selected for seed beds is ploughed several times and worked over and, exposing it as much possible to light and air as a means of avoiding "mosaic" disease. The beds are made 12 ft. long by 4 ft. wide and eight, and are provided with drainage and irrigation ditches. Water is applied in them during the first five days to flood the seed beds and dry ants. Three days before the seed is sown rice straw is spread over the beds and after it has lain one day to attract insects it is burnt over each bed a bamboo framework is made, on which mats can be hung to afford shade when necessary.

[illegible]

The young plants are planted out in about thirty-five to forty after sowing, on thoroughly watered ground, and are watered daily the first seven days.

The rest of the cultivation consists in breaking up the soil round plants whenever it becomes hard, in heaping soil round the bases of stems, in removing and burning weak or diseased plants and replacing them.

Harvesting. — In general the tobacco is not topped, nor are suckers removed. The leaves are picked singly in the early morning when they are poorest in starch, beginning with the bottom leaves, a rule eight bottom leaves, ten middle and six top leaves are obtained the three kinds being kept separate also in all the successive operations. The leaves are then hung up to dry in the drying sheds, which are fairly well ventilated, but which are allowed the least possible amount of light.

The dry leaves are made up into bundles of fifty to fifty-five leaves each, and placed to ferment in rectangular heaps of twenty layers, each consisting of about 500 bundles. After about five days the temperature rises to 60° C. The heaps are then unpacked and with the contents of every two of them a new heap is made containing forty layers. The unpacking of the heaps when their temperature rises to 60° C. and removal of larger ones, is repeated usually three more times, thus five in all, being always taken to place the bundles that were on the outside of the previous heap in the middle of the new one.

Grading. — The sorting of the leaves is done first according to quality and then according to colour. Six classes are made: 1) complete leaves of good texture and free from stains; 2) as above, but showing fungoid disease stains; 3) broken leaves, subdivided into four qualities; 4) leaves showing pressure marks; 5) leaves showing spots; 6) the leaves.

The graded tobacco is made into "hands" consisting of 30 to 40 leaves and the hands are packed under pressure into bales of about 100 lbs. in weight. The tobacco is shipped from Semarang to Amsterdam.

The yield of finished tobacco is about 1260 lbs. per acre, and the average price is about 1 shilling per pound.

Diseases and Pests. — Throughout, a very careful watch is kept against insect pests, and the village children are paid to collect and destroy the *Phytophthora nicotianae* is very prevalent. The diseased plants are uprooted and burnt, and the holes are filled with a mixture of lime and ammonium sulphate solution. The plants are sprayed with Bordeaux mixture. Another outbreak has occurred.

A new plant disease, known as "black rot", which is a bacterial disease, has been found in Java, or which has not been widely spread, but on the whole does very

The Fuller's Teasel.

LEMORE, W.: *Royal Botanical Gardens Kew. Bulletin of Miscellaneous Information*, 7, pp. 315-350. London, 1912.

His article is the result of a request received at Kew from a firm respecting the increasing difficulty of obtaining a regular supply of teasels, and it also gives bibliographical notices concerning the cultivation of this plant in Great Britain and the United States.

It has not been found possible to construct a machine capable of giving the same finish to cloth as is obtained by the use of the teasel.

In commerce, these heads are known by different names: "king" (the central head, which terminates the main axis and is always erect); "queens" (found at the ends of the principal branches); "es," or "buttons" (borne by minor branches). One English firm has divided the teasel heads into 70 different sizes previous to selling them to tanners.

France has perhaps the largest acreage under teasels, and French teasels fetch the highest prices, but this plant is also cultivated in England, the United States and Germany.

In England, land is hired from farmers by Messrs. North for the cultivation of one crop at the rate of £6 per acre per year. Ground which will grow good wheat is considered most suitable for teasels and, when a crop of wheat is followed by teasels, the soil being well worked, manured. Seeds are drilled into the ground in March of one year succeeding year's crop. The ground is weeded in June and again when the plants are thinned out. In October, a further cleaning of the ground and loosening of the soil takes place.

The following year, in March, the ground is loosened and the plants finally thinned, leaving left about three feet apart each way; any gaps caused by death or damp or frost in winter are filled up. In June and July (the growing season) a strict watch is kept in view of a possible attack by blights. The harvest takes place in August and September. The heads are dried in sheds with open sides and thatched roofs, which are erected in fields. The heads mature at different periods, so the plants have to be gone over several times. They are cut with about six inches of stem and tied up in handfuls, threaded on long poles, and hung in the sheds for about five weeks to dry. They are then taken into a barn, sorted, and tied up into bundles for sale. The price of a bundle varies from 35s. to 45s.

The annual value of the teasel trade in France is estimated at £15,000; while the value in Germany is estimated at £349,000. In 1911, from Germany, 681,000 heads were exported to the United States. Two critical periods in the cultivation of teasels are mentioned: one is during winter, when the plants are liable to be killed by frost, and the other is in the autumn, when the plants are liable to be killed by wet weather. The cultivation of teasels has been suggested as a means of improving the soil, but not on a sufficient scale to be of much value. The opinion is formed as to the financial results of the cultivation of teasels from experience.

one would be inclined to consider that such a scheme would be a financial failure, for the gross average income from an acre of teasels is about £70 and this after the ground has been occupied for 18 months, while the necessary expenses of building portable houses, soil renewal, etc., would be very heavy.

There appears good reason to suppose that better results might be obtained by moving the cultural area from Yorkshire and the western counties to Essex and Hertfordshire and perhaps Norfolk and Suffolk. Experiments might be conducted with a view to obtaining a race which would stand the winter well and mature earlier. Seeds should be selected from well grown heads. Experiments ought also to be made in order to save the ground for one summer by sowing seeds thinly on a small area of ground; a crop of wheat could be taken from the rest and teasels planted out in autumn.

Cultivation in France. — In France, the plant is found to be the best in a light, gravelly soil with a southern aspect. The seeds are sown in spring and the young plants well thinned out. In August, they are transplanted into rows about 12 to 15 inches apart and are kept weeded during the winter. Sometimes the teasels are sown in the place where they are to remain and a cereal is grown with them, so that a crop may be obtained from the ground during the first year. In the following spring, as soon as the plants have attained a height of from 20 to 24 inches, a number of the side shoots are removed, eight or twelve being left for each plant. Harvesting is commenced when the leaves begin to wither or to turn yellow. When dry, the heads are packed in boxes containing from 25 to 100 each, all of uniform size and colour. In 1909, 36090 heads of teasels were grown in the three districts of Bouches-du-Rhône, Vaucluse and Seine-et-Oise, and the 40 380 cwt. of heads produced were valued at £51 237.

Cultivation in the United States. — In America, it is usual to sow the seeds in drills 3 to 3½ ft. apart with a thin crop of corn. When grain is gathered and the straw left standing to afford protection from snow during winter. The plants are eventually thinned to eight or ten inches apart in the rows, and harvesting takes place in a similar manner to that adopted in England. The average crop is 100 000 heads per acre (about the same as in England), and the medium price in New York is from 90 cents to one dollar a thousand, though it may drop to 50 cents or rise to two dollars. The holes are said to weigh ten pounds. Teasel growing for the hat industry in the State of New York. The crop is said to be the best in the State (Clackamas County).

The crop is said to be the best in the State (Clackamas County). The heads are said to weigh ten pounds and are used for the hat industry.

Fruit and Vegetables in Alaska.

S. Department of Agriculture, Annual Report of Alaska Agricultural Experiment Stations for 1911. Washington, 1912.

At the Sitka Experimental Station a hardy strawberry has been produced by crossing the cultivated variety with a wild native Alaskan plant. The new variety appears to be well adapted to the climatic conditions of the region, and gives far better yields than either of its parents.

In the apple orchard, planted in 1903, ripe fruit was produced for the first time in 1911, possibly owing to the exceptionally fine weather of September and early October of that year. The fruiting varieties were all of crab descent.

Cherry and plum trees continue to prove unsuitable to the prevailing conditions; but currants, raspberries and gooseberries do well and are raised by a number of varieties.

With regard to vegetables: variety trials of potatoes, cabbages, cauliflowers, lettuces and radishes were continued; the results show that the crops, with regard to both quality and quantity, may be obtained equally in the coastal region of Sitka but also at the interior stations of Fairbanks.

The Passion Fruit in New South Wales.

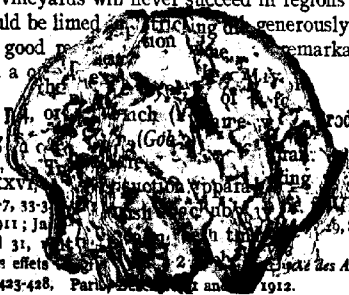
ARM, W. J. in *The Agricultural Gazette of New South Wales*, Vol. XXIII, Part II, pp. 975-979. Sydney, November 2, 1912.

The passion vine flourishes on many classes of soils (some extremely poor), and has been found specially useful for interplanting in young plantations in the Cumberland, Penang Mountain and Gosford districts (N. S. W.). Plants may be raised from seed sown in February. The vines planted out in August or September in rows 10 ft. by 12 ft.

The young vine is trained up a stake with a single stem to a height of 5 feet; then it is allowed to throw out two to four leaders, which are made to run either way along two horizontal wires about 6 in. apart. In the second year after planting, two good crops of fruit are obtained in summer and winter — and by pruning away the summer crop when it is down, a large yield is obtained in winter when other fruits are scarce. The vine is maintained for about four years, after which the plants are grubbed. The vineyards will never succeed in regions exposed to frost, and the land should be limed and liberally treated with fertilizers to obtain good results. The fruit is remarkably fine and keeps well in a cool place.

Investigations and Experiments on the Production of Passion Fruit on the Vine by Grafting.

VIATA, P. and PACOTTET, J. *Revue de Viticulture*, Vols. XXXV, 1911, pp. 585-590, 5-7, 33-35. Paris, December 21, 1911; *Journal de Viticulture*, 1911 and 1912, pp. 511-512 and 513-514, 1911; *Revue de Viticulture*, 1912, pp. 511-512 and 513-514, 1912. — *Revue de Viticulture*, 1912, pp. 511-512 and 513-514, 1912. — *Revue de Viticulture*, 1912, pp. 511-512 and 513-514, 1912.



1. — The theories which have been promulgated during the few years respecting the reciprocal influence of stock and graft have no wise modified the practice of reconstituting vineyards by planting them with American vines resistant to phylloxera. Nevertheless the importance which recent scientific work seems to attach to question of the reciprocal action of stock and graft was not unknown to vine-growers.

Vine-growers have always been a little afraid as to the effect graft might have on their vines and the quality of the wines, and all the since reconstitution with American vines has made grafting general.

The writers, like other vine-growers, have for a number of years made observations in the vineyards as to the influence exerted by different stocks on the various grafts. These observations have been made in a comparative and more scientific manner, by experimenting on the different experimental plots set apart for this purpose.

The following is a short summary of their important studies.

"Observations and experiments made in the vineyard and continuously in the experiment field, not for two or three years alone, but extending over a period of fifteen years, show that the variations thought to be due to grafting do not exist and have never existed.

"The numerous facts which we have ascertained by means of comparative observations in the course of this work, have also shown that the characters and qualities of high-class and of ordinary wines are not improved by grafting French or European varieties on American stocks."

2. — In 1908, the "Société des Agriculteurs de France" appointed a Commission of Enquiry regarding grafting and its consequences. The work of this Commission was the centralization of the greatest possible number of documents and the control on the spot of the facts collected.

They began by drawing up a question schedule, which was distributed throughout France to viticultural syndicates, associations and societies as well as to the chief vine-growers, for the purpose of collecting opinions and known facts for or against grafting. In March 1909, replies to these questions were divided as follows:

Two hundred and twenty-nine were in favour of grafting.

One hundred and eighty-nine answers were to the effect that there was no difference between grafted and non-grafted vines.

Twenty reported the holes and cankers on the trunks of vines grafted on American stocks.

Ten reported that the grafted vines were more liable to diseases, i.e., to mildew, to rot, to canker, to rust, to pruning or staking.

Nine reported that the grafted vines were of inferior quality in quality of the wine.

Thus, thirty-seven answers were unfavourable to grafting, and thirty-seven answers were favourable. The quality of the vines was considered. It was thus seen that the quality of the vines which had given rise to the contradictory opinions was verified on the spot.

the delegation entrusted with this duty made its first tour in the west and south, from the 8th to the 22nd of August 1909, and came to the following conclusions:

From the data collected, it is clearly seen that the objections made to the practice of using tobacco refuse are not sufficiently well-grounded to prove any degenerative effects or modifications due to this practice, as usually effected; the requisite conditions of affinity and adaptation are present, and the other vital necessities of the vine are not neglected." The Commission proposed continuing its studies during the course of the summer of 1910, in Burgundy, Champagne and Franche-Comté, as prevented owing to the very unfavourable weather. But from the information received from these regions, and which came from absolutely reliable sources, it appears that no facts were discovered which would have made it necessary to modify the above-mentioned conclusions. The Commission therefore proposed to the Viticultural Section of the Society that the enquiry should be suspended for the present.

Manuring Vineyards with Tobacco Refuse in Hungary.

120, IMRE.: Szőlőművelés dohányhulladék trágyával. — *Borászati Lapok*, Year Nos. 50 and 51, pp. 778-780 and 795-797. Budapest, December 8 and 14, 1912.

This is a study and discussion of the problem of manuring vineyards with tobacco refuse according to the experiments made in 1912 in the vineyards of Count Batthány at Szabadbattyán.

This problem is interesting, as the question of manuring becomes more urgent in the sandy vineyards of Hungary, where, owing to the insufficient quantity of stable manure, it is sought to introduce manures rich in organic matter, such as dried pigs' dung and town refuse, the use of which however is more costly than that of tobacco

refuse. The vineyards in which the experiments were carried out were divided into five groups, each of which contained five plots of 1712 square metres each. All of them, save two, were planted with Riesling grapes. In the rows of vines furrows about 14 inches deep were opened, and the tobacco refuse, completed by artificials, was placed. The manures were applied in three different doses: medium, heavy and very

heavy. In order to compare the effect of the tobacco refuse with that of the phosphatic manures, superphosphates and bone-meal, the latter also in order to study the effect of the tobacco refuse on the composition of the soil, the tobacco refuse was compared with the tobacco refuse. The quantities of tobacco refuse were calculated on the basis of the composition of the tobacco refuse, and that of the tobacco refuse was compared with the tobacco refuse. The quantity of pigs' dung used was compared with the tobacco refuse. The results are shown by the following table. The tobacco refuse thus contained more organic matter than the dried pigs' dung, but more organic matter than the tobacco refuse. The year 1912 did not produce a good crop of wine, so that the result of the experiments was not as was expected.

TABLE I

	Water per cent.	Organic matter per cent.	Nitrogen per cent.	Phosphoric acid per cent.
Tobacco refuse	10	60	2.3	0.4
Dired pigs' dung	13	56	1.9	2.2

Nevertheless it shows that tobacco refuse is useful for the vine, especially as a source of humus; it is particularly suitable, with a complete phosphatic and potassic manures, for sandy soils where vegetation is vigorous.

The writer recommends the following quantities per acre per an for four years, which are not excessive.

1st year: 6154 lbs. of tobacco refuse, 309 lbs. of superphosphate 112 lbs. of 40 per cent. potash salts.

2nd year: no manure.

3rd year: 243 lbs. of superphosphate, 112 lbs. of 40 per cent. ash salts and 93 lbs. of sulphate of ammonia.

4th year: 61 lbs. of sulphate of ammonia.

The writer is of opinion that in cases when farmyard manure is so tobacco refuse, owing to its high content in organic matter and its even action, is one of the most economical and useful manures, especially in the sandy mountain vineyards.

140 - Irrigation of Olives and Its Effects.

SOMMA, U. L'irrigazione all'olivo e sua azione. — *Le Stazioni sperimentali agrarie italiane*, Vol. XLV, Part 12, pp. 930-939. Modena, 1912.

Experiments carried out at Bari, upon old trees in full bearing on light, permeable soil (calcareous tufa) irrigated with slightly brack water twice, at the beginning of June and the beginning of August means of a basin of 10 ft. radius round the trunk of the tree, containing 135 gals. of water. Fertilizer per tree: 66 lbs. of stable manure, 2 1/4 lbs. of mineral superphosphate, 1 lb. of sulphate of ammonia, 1 lb. of phosphate of potash.

Average per tree during the four years 1909-12

Leaves and twigs	lbs. 41.4	31.4
Olive crop	lbs. 87.8	64.5
Average yield per tree	6 lbs. 50z.	60bs. 7
Olives per acre	1668	1782
Proportion of leaves to fruit	17.4	18.6
Percentage of increase in yield	42.217	41.940
Percentage of increase in value	57.793	58.053
Percentage of increase in oil	23.295	21.999
Oil from 100 fresh olives	gr. 38.809	37.598

he Uses of *Roystonea regia*.

the royal palm (*Roystonea regia* Cook) grows wild throughout the West Indies and also in South Florida, Mexico, Central America, and in the northern part of South America. It is especially abundant on damp soil, such as is suitable for tobacco cultivation. In the west of Cuba it is found on land which was formerly cultivated, but has since been abandoned. The trunk is often 70 to 85 ft. high, with a diameter at the base as much as 24 inches. The wood is considered unsuitable for building purposes, but the external layer of hard wood is much used for making sticks, stakes, fences, posts, tables, coffee mortars, and the partition walls of houses. The most useful portion is the bark, a kind of coriaceous bark. The large terminal leaves have pinnate petioles 4 to 9 ft. long and as wide as the circumference of the stem. Every three or four weeks, a leaf falls; this is damaged by means of weights, and dried. The dried petioles are sold as cord and provide the best packing material for export tobacco. The leaves supply a fibre from which ropes and string are made. In Cuba, the bark is also used in the construction of the poorest houses. The young bud is edible, but its removal causes the death of the tree. It is one of the most elegant palms for planting in avenues.

The Scientific Application of Epsom Salts when Planted Out.

- 1 The situation of the roots of the tree in the soil.
- 2 The nature of the young trees.
- 3 The method of action of different diseases.

An account is given of the following method. The chemical fertilizers (phospho-potassic) are well mixed with the superficial soil, is to be put first of all in the trench; then comes a layer of ordinary 8 to 12 inches deep, next the nitrogenous fertilizer, if this is used (of soda, sulphate of ammonia, guano, etc.), and finally, the last of soil to fill up the trench.

The soluble nitrogen in nitrogenous fertilizers finds its way usually to the roots; thus a nitrogenous fertilizer of a very caustic nature is no longer in direct contact with the roots where it might be hurt.

The organic manures are placed in an intermediate layer, not too deep nor too superficial, and without being in direct contact with the roots they do not incur any risk of loss or of drying up; they are sides rendered powerless as propagators of fungus diseases.

The phosphoric acid and potash contained in less mobile art fertilizers are directly within reach of the roots and can be absorbed they become capable of assimilation.

The writer adds that it is well to give the young tree for about years, in some form or other: 25-30 gr. (about 1 oz.) of nitrogen, gr. (1 to 1 1/2 oz.) of phosphoric acid, 40-45 gr. (about 1 1/2 oz.) of phosphate of soda, 7 to 9 oz. of basic slag, or the corresponding weight superphosphate, and 3 oz. of potassium chloride. If the soil is poor in lime, the lime contained in the slag suffices. The fertilizers in the amounts calculated for three years, should be applied on the surface and at the end of this time should be dug in as deep as possible, so they may reach the roots.

143 - Forest Fires in the United States: Their Causes, Extent and Control.

1. PLUMMER, FRID. G.: Forest Fires: Their Causes, Extent, and Effects, with a Set of Recorded Destruction and Loss. — U. S. Department of Agriculture, Forest Service, Bulletin 117, pp. 39 + figs. 6 + plate 1. Washington, 1912.

2. PETERS, J. G.: Forest Fire Protection under the Weeks Law in Co-operative States. — U. S. Department of Agriculture, Forest Service, Circular 205, pp. 15 + 1. Washington, 1912.

3. GRAVES, H. S.: Protection of Forests from Fires. — U. S. Department of Agriculture, Forest Service, Bulletin 117, pp. 1 + plates X. Washington, 1912.

4. ADAMS, D.: The Prevention and Control of Forest Fires. — U. S. Department of Agriculture, Forest Service, Circular 205, pp. 15 + 1. Washington, 1912.

5. SULLIVAN, J. W.: The National Forests. — U. S. Department of Agriculture, Forest Service, Circular 205, pp. 15 + 1. Washington, 1912.

I. — have caused an average of loss of about \$25,000,000 worth of trees, crops, buildings, and other improvements to the Nation's forests more. To these must be added enormous losses in the destruction of young tree growth, and

of the soil, damage to water courses and adjacent property by fire and flood, interruption of business, and depreciation of property. By an inquiry into the causes and extent of such fires we are able to estimate in some degree the magnitude of these losses.

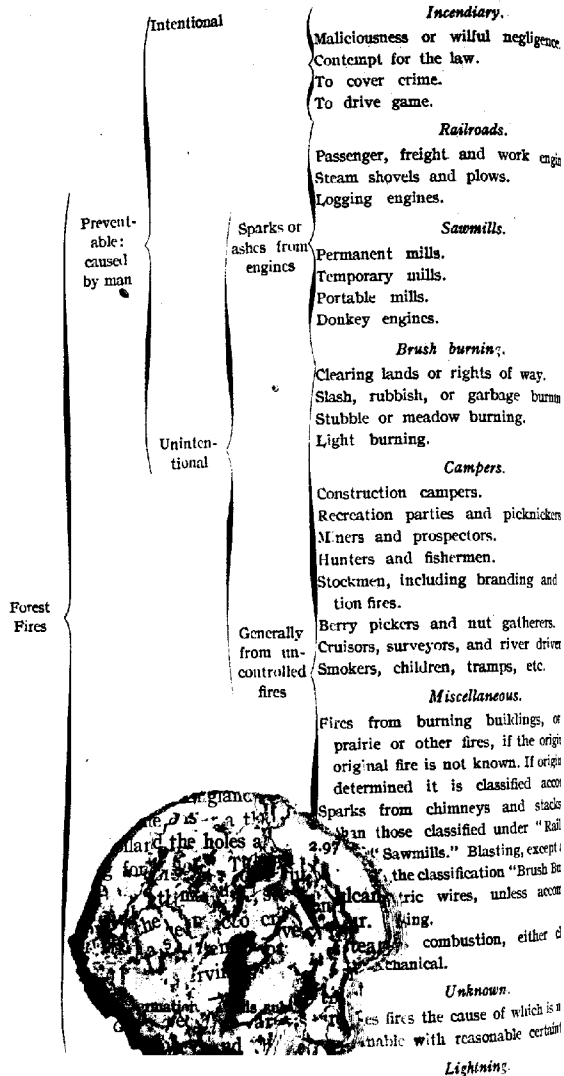
The first compilation of forest-fire statistics for the whole United States was by Prof. C. S. Sargent for 1880, published in the Tenth Census, Vol. IX. In 1891 the Division of Forestry of the Department of Agriculture collected statistics of forest, prairie, and crop fires. The Fire Tables for the year 1900 report a loss of \$2 246 000 from fires, compiled by insurance companies. In 1900 and 1901 the Division of Forestry made a second attempt to gather statistics upon which the loss from forest fires might be estimated. New data have been obtained from: (a) reports of fires on National Forests; (b) reports of State Foresters from 17 States; (c) supplemental reports of forest supervisors outside the National Forests; (d) reports of lumbermen's associations; (e) newspaper accounts from press-clipping bureaus of recent fires; (f) the Forest Atlas (this is the central map system of the Forest Service and contains manuscript maps); (g) investigations of Forest Rangers, particularly in even-aged forests, to determine by stem analysis the dates of old burns. Before this mass of material could be used a record of each event was reduced to a common standard, and a card was devised, as shown below:

Sample of U. S. Forest Service fire record.

Kind of fire: Forest - Brush Land - Prairie (Check Mark Proper Term).			
Location {	State,	Date {	Year,
f {	County,	of {	Month,
e {	Near	Fire {	Day (or Days),
Kind of fire, Timber burned, board feet. Acres of timber burned, Value of other property burned, Number of buildings burned: . . . houses, . . . barns, . . . mills, and . . . others. Number of lives lost, . . . Number stock lost, . . . horses, . . . sheep. Remarks:			
If above information is furnished by Name of person furnishing information, Title, Address, City, State,			

is the value of a fire. It is necessary that there should be a system of recording the causes and extent of fires. The following scheme is recommended for general use and logical.

Classification of the causes of forest fires.



most accurate data on the causes of forest fires are from the report on the National Forests.

*Average per cent. of causes to total number of fires
in the U. S. National Forests from 1906 to 1911 inclusive.*

Railroads	26.7
Lightning	17.5
Incendiary	4.5
Brush burning	4.8
Campers	16.9
Sawmills	1.1
Unknown	20.7
Miscellaneous	7.8

number of conditions in the forest contribute either to the inception or to the spread of fires.

Contributory forest causes	{	natural - litter, etc. artificial - logging refuse, etc. insects.
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climate also must be considered with other variable factors as contributory cause of fires.

Contributory climatic causes	{	droughts. hot seasons. hot waves. warm winds.
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The forest fire season of 1911 marked the first year's operation of the Weeks law. This section authorizes the U. S. Department of Agriculture to co-operate with States in protecting fire-prone watersheds (catchment basins) of navigable streams. The States which received Federal aid under Weeks law in 1911 were as follows: the total amounts expended by them and by the Government are as follows:

States Expenditure	.....	\$ 21
Federal " "	.....	21
Alloiment to States	.....	21
Unexpended	{	Balance

There are reported many forest fires in the United States under the Weeks law. Hundreds of fires are reported annually, many of them caused by careless smokers and hunters, and many of them are promptly extinguished by patrolmen. The law is on permanent basis that will simplify fire prevention. But

in addition to these tangible results, which have been apparent from start, the educational value of the work, although not measurable, has been far-reaching. Except in a few States, 1911 was the first year any systematic State patrol of the forest was conducted; it marks a general extension of the State organization co-operating with the Federal Government. The most effective work of the patrolmen was in warning persons met in the woods of the danger of setting fires, and in enforcing them of the fire laws.

3, 4, and 5. — The U. S. Forest Service has made various publications on forest fires prevention and control. The following are the chief points as set down by the Chief Forester, H. S. Graves.

For the successful protection of a forest from fire there are necessary

- a) the elimination, so far as possible, of the causes of fires;
- b) a proper organization of the forest, including the disposal of slash, opening of roads, the construction of trails, etc.;
- c) an adequate supervision;
- d) facilities for fighting fires.

As to the principles of fighting forest fires, they are recognized essentially as those of fighting fires in cities. The following are of importance:

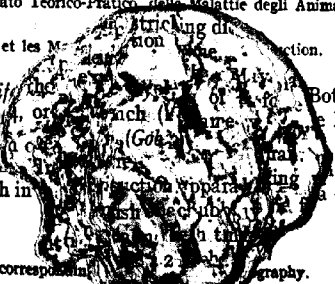
- a) quick arrival at the fire;
- b) an adequate force;
- c) proper equipment;
- d) a thorough organization of the fighting crew;
- e) skill in attacking and fighting fires.

LIVE STOCK AND BREEDING.

144 - Warble Flies.

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bovis Geer and *Hypoderma*... (G... Diptera,
Destrudæ. Both are... Railliet
(1) *H. bovis* is found... now only
has been met with in... a commu-
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- e numbers refer to the corresponding... graphy.

notification from the Government of the Commonwealth of Australia, the continent is free from warble flies. On imported cattle in some warbles were observed, but the animals were quarantined and the destroyed.

An official of the United States Bureau of Animal Industry observed that the female of *H. lineata* deposited its eggs, about 1 mm. in length, by means of a blunt ovipositor on the hair of the cattle, most frequently preferring the hair of the forelegs. As many as six eggs have been found on one hair. Every egg has an appendage, which adheres to the hair. The eggs contain fully developed young larvæ. Egg-laying takes place during the warmest part of the year.

Cooper Curtice (Bibl. 1) found in 1890 young larvæ of *H. lineata* in the throat of cattle, and it is probable that the eggs are licked off the animals and thus find their way into the cavity of the mouth, where the larvæ hatch out. They migrate thence into the muscular tissue of the gullet and moult after some time. Later, in the winter months, warble larvæ are found in the adipose tissue of the spinal cavity and towards spring they appear under the skin. Here they moult twice, producing abscesses. They bore an aperture through the skin, which also serves for the introduction of air; then, when they have completed the bot or maggot stage, as a passage by which they leave their host.

They then fall to the ground on which, or just under the sun, they turn to pupæ and emerge, after from three to six weeks, as perfectly sexually mature flies.

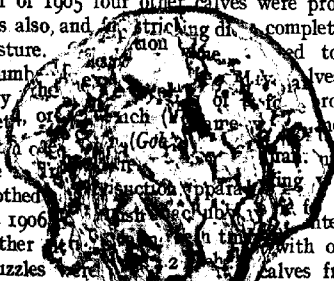
In the Southern States of the United States the first warble fly appears in the spring (Bibl. 28); in Europe their appearance is limited to the summer months from June to August. The fully developed warble fly has only rudimentary mouth parts; it consequently takes no food and lives but a short time.

What has been said of *H. lineata* holds good for *H. bovis*, with the exception that until lately no investigator had been able to ascertain whether this oestrid also laid its eggs on the hair of cattle and what part of the animal it preferred. In the summer of 1912, Gläser (Bibl. 29) however, was enabled to observe an unfecundated female of *H. bovis* laying eggs. He set the fly on the back of a bull, and saw after some time that this fly drove its ovipositor into the coat of the animal. He then found, on a spot the size of a florin, one centimetre in extent, eight eggs and on another place, the size of a half florin, one centimetre, upon which the fly also stopped, four eggs. The eggs were found on the back of the bull, rather close to the skin. The female was seen only when the hair was rubbed the other way. The observation is very probable that under the skin the eggs develop and are later hatched. The males of *H. bovis* are very common on cattle and, like *H. lineata*, attach themselves to the hair. In this view is the fact that the appendage which serves for fastening the eggs to the hair. Gläser (Bibl. 5) supposes that *H. bovis* also lays its eggs on the hair of the feet, because he observed

that in Ireland warble flies swarmed especially round the feet of ani-

pinions are still divided as to how the larvæ of *H. bovis* find their way into the body of the cattle. Hinrichsen had (according to Railliet) in 1884 discovered larvæ of these flies in the throats of cattle. (Bibl. 14) examined, during 1910 and 1911, in the Hamburg slaughter house, the gullets of 9326 head of cattle and found 2013 of the annoying *Hypoderma* larvæ. In April the affected gullets were 9.29 per cent., in May 1.75 per cent., from December to February from 28.39 to 42 per cent. Other investigators have found larvæ in the midriff, spinal cavity and in the muscular tissue under the skin. Nevertheless Stub (Bibl. 2) sets up the theory that the larvæ found in the throat do not attain full development, but perish in the body of the animal. According to him the larvæ of *H. bovis* can only develop normally when they have bored a passage through the skin from the outside. He found, examining the hides of slaughtered animals, minute passages which run right through the hide, each of them containing at its inner extremity a young warble larva in the first stage of development (after first moult). Several of these passages from the outside reached to about the middle of the hide. Gläser (Bibl. 18), on the other hand, is of the opinion that the passages are to be found, starting from the inside, do not go right through the hide. He doubts the existence of fine passages through the hide, but says that Stub has set out his observations in March, namely at a time when possibly the larvæ have already bored through from the inside to the outside. (Bibl. 13) is of opinion that the larvæ enter the animal by the gullet, through the hide from the inside as far as the roots of the hairs, from this point to the outside the opening is completed indirectly by inflammatory processes. In support of this view Peter in his paper contains several figures showing cross sections and a longitudinal section of such passages.

Carpenter (Bibl. 5, 6, 7) has been conducting experiments for some time past in Ireland, with the object of ascertaining how *Hypoderma* enters the bodies of cattle. He kept during the years 1904 and 1905 calves always covered with a cloth together with other calves on a pasture; in the summer of 1905 four other calves were provided with rings for their limbs also, and the striking difference was completely covered; kept on the pasture. The average number of flies which attacked the calves protected by clothing differed very little from that of the unprotected animals. Only the complete covering of the calves in the spring was quite free from the calves. (Göbel) found the larvæ in the calves it was not possible to find any section apparatus. In the summers of 1906 the calves were provided with leather muzzles and other calves from licking the pasture. The muzzles were



themselves and thus affording warble larvæ or their eggs the means of passing through the calves' mouths into their bodies. During the summer and whilst feeding their necks were fastened in such a manner to a wooden frame that the animals could not lick themselves, but which, the fore-legs were clothed. Nevertheless, in the spring of 1908 five of these muzzled calves had 10 to 27 warble larvæ on them; one was completely free. Two calves which had worn muzzles in 1907 bore no warbles in 1908. In the summer of 1908 other six calves were kept muzzled on the pasture. Instead of clothing their forelegs, a kind of apron formed by a sack was hung round the animals' necks to prevent them from licking their forelegs. The above-mentioned wooden frame was also used. In spite of these measures, in the following spring all protected calves had an average of 4.66 warbles, against an average of 4.33 warbles on the nine unmuzzled control calves. In the summer of 1909 five muzzled calves were kept on the pasture. Over the leather muzzle a large wire one was placed so as to prevent the calves taking larvæ through the openings in the leather muzzle. The other precautions were the same as had been previously taken. Together with the five calves fifteen control calves were sent into the same pasture. Five of these latter calves had in the spring of 1910 an average of 6.33 warbles. Three of the muzzled calves had only one warble each, one had three and one had four. Carpenter adds that by means of the wire muzzle at least a partial protection against the larvæ was obtained. The results would probably have been better if the wire muzzles had been immediately used with the leather ones. But the former arrived only at the end of May, so that the calves were protected during the warm last week in May only by the leather muzzles. — Carpenter is continuing his experiments.

III. *Kind and extent of injury caused by warble flies.* — There can be no doubt that warble flies injure cattle in various ways. In the first place their presence disturbs grazing cattle. In the Pedernales valley in North America it has been observed that out of fear of warble flies the herds leave off grazing during the warm hours of the summer days and seek refuge in the river.

The injury that the animals suffer from the larvæ can consist in lower milk yield and in the depreciation of their flesh and hides. The loss in milk is valued in England at 20 per cent., but this estimate cannot be accepted, the loss being as low as 2 per cent.

The injury to the hides is also considerable. The inflammatory modification of the skin caused by the larvæ; the inflammation is revealed by a swelling of the skin and a reddening of the meat. The hide is also covered with a thick layer of pus.

The damage to the hides is also considerable. Krause (Bibl. 17) has endeavoured to estimate the damage in Germany. He sent a questionnaire to the various tanneries requesting them to answer the question: "What is the damage in hides? About 50 per cent. gave the desired information. Of these, 10 per cent. of which, together with

94. Assuming the depreciation in North Germany to be 3s. 9 ³/₄ d. in South Germany 3s. 6 ³/₄ d. per hide, the total loss in Germany was £178 142 8s.

Gayet and Vaney (Bibl. 4) state that in Forez (Dep. de la Loire, France) on examining some herds, warbles were found on 4 per cent. of the cattle aged three years and upwards and on 52 per cent. of the one- and two-year olds.

According to De Vries (Bibl. 19) from 30 to 33 per cent. of the cattle in Holland are affected by warbles.

in Canada (Bibl. 29, 30) warble infection is especially considerable in the provinces of Manitoba, Saskatchewan and Alberta. It is customary to increase the purchase price by two dollars for every head of cattle found free from warbles.

V. The destruction of warble flies has not hitherto been rendered compulsory by legislation in any country except the German State of Oldenburg (Bibl. 17), in which a ministerial decree of March 11, 1910, orders that in the district of the Wesermarsch Herdbook Association the destruction of warbles is to be carried out. The Chamber of Agriculture of Oldenburg in the years 1910 and 1911, a circular to the agricultural and milk producers' associations, enquiring as to the success which up to then had attended the destruction of the pest, received the following reports: 6 reports of partial success; 6 reports of no success; 9 reports of complete success. According to the above-mentioned circular it is stated that a conclusion cannot be drawn from the results obtained during the past year, owing to the fact that the number of flies was small. With few exceptions all the reports are favourable. (Goldschmidt, 1912). In the experience of Denmark and demand that they be destroyed. (Goldschmidt, 1912). An extended investigation of the whole Duchy of Schleswig-Holstein, conducted by the Danish Agricultural Society, showed that Denmark was the first country in which measures were taken to combat warble flies by private initiative. The Danish Dairying Co-operative Association began the destruction of warbles in 1902, and has continued it since then (Bibl. 17).

the herds a fortnight before they are sent out to graze. The larvae removed by a steel instrument. Immediately before being sent to pasture and several times in the course of the summer the animal again examined and the larvae removed.

The following table gives data on the cost of the work and on the results obtained.

Year	Stock	Head of Cattle	Number of Larvae	Cost per head of
1906	Old stock	3 756	4 016	0.45
	Cattle bought	286	4 980	
1907	Old stock	3 810	7 100	0.52
	Cattle bought	439	5 855	
1908	Old stock	4 076	1 123	0.39
	Cattle bought	186	2 448	
1909	Old stock	3 614	1 116	0.43
	Cattle bought	261	3 926	
1910	Old stock	3 348	369	0.35
	Cattle bought	209	3 506	

In Ireland, Carpenter (Bibl. 5, 6, 7) began in 1907 the destruction of warbles at the Agricultural Experiment Station of Ballyhaise. The average number of warbles per head of cattle in the herd sank from 10.77 in 1907 to 4.44 in 1908. In 1909 the average number of warbles per head of cattle was 2.52. It is worthy of note that all the cattle in the herd were treated with the centre of the farm on average 10 times a year. The results obtained are better than those which have been obtained elsewhere.

The results obtained in Denmark are given in the following table. According to Boas (Bibl. 27) the Danish method of warble destruction was first published in 1907.

In Germany the first systematic extermination of the warble pest was formed in 1907. The results obtained are given in the following table. The publisher of a periodical and sup-

scientific investigation on the life history of the warble fly. At the meetings of the German Agricultural Association (Deutsche Landwirtschaftsgesellschaft) in Hamburg in 1910 and at Cassel in 1911 there were special exhibits showing leather with warble holes, skins with fresh eggs and warble larvae in their various stages of development.

In the Municipal Bureau of Public Health in Berlin a volunteer committee for the investigation of the life history of warble flies has been organized. For the defrayal of the expense, the Imperial Ministry of Agriculture has contributed up to now about £ 200, several representative of the leather industry about £ 250 and other groups of people interested in the question about £ 150.

In France the French association for the destruction of warble flies was founded in November 1910, provisionally for 10 years. The members pay subscriptions of from 16 s. to £ 20. The association publishes a periodical containing papers on warble flies. In No. 2 of the above periodical there is an article intended as a guide for elementary school teachers in lessons on warble flies.

The association has provided the veterinary school at Alfort and the tannery in Lyons with a steer affected with warbles to be used for dissections. It has further induced the horse gelders (Hongreurs) of the Department of Allier to undertake the campaign against warbles at a rate of 18. 8d. per 100 larvae. It appears also that school children are given a reward, somewhat higher than the above, for the larvae they find.

The association has also addressed a circular to the directors of agricultural schools, to the teachers of agriculture and to the departmental veterinary surgeons begging them to give assistance to the work of destroying warble flies. At the request of the Association the Ministry of Agriculture has appointed an official for the investigation of the life history of the warble fly and has granted the Association a contribution of about £ 40.

In Sweden in the elementary schools instruction is frequently given on the warble fly and its destruction. It is believed that in consequence of this teaching the pest has somewhat abated.

The Ministries of Great Britain, Belgium, Switzerland, Austria, Italy, United States and Canada have hitherto limited their action to informing farmers by means of publications on warble flies.

In Russia, Norway, Holland, Denmark, etc., there are only a few publications on the subject.

In the United Kingdom, the Council of the Royal Society of Agriculture has been prevented by the Commonwealth Quarantine Act from introducing this Act into force in respect of the warble fly. The Government is now considering an amendment of the Quarantine Act to enable it to do so.

145 - Anaplasmosis in Cattle (1).

La tristeza en los bovinos. Una nueva forma del mal. -- *Revista de la Asociación del Uruguay*, Year XLI, No. 9, pp. 684-686. Montevideo, 1912.

An extract from the account furnished by Dr. Lignéres, Director of the Bacteriological Institute, and Chief of the Cattle Breeding Division of the Ministry of Agriculture of the Republic of Argentina.

Dr. Lignéres showed some time ago, that inoculation with *Pyopma bigeminum* did not confer immunity from *P. argentinum*, and the spite of successive transmissions during a period of some months, two parasites retained their own special characteristics. Similar statements are made in South Africa and elsewhere: thus the individua of these two causes of pyroplasmosis has been established.

From the end of 1911 until April 1912, Dr. Lignéres had occasion to study several abnormal outbreaks of gall-sickness ("tristeza") in inoculated cattle and in creol cattle, which are naturally immune. On reproducing the disease in the laboratory by means of the blood of infected animals, he obtained a new form of "tristeza," caused by a hæmatozoon different from those hitherto found in Argentina.

Under natural conditions, the new disease usually does not occur alone, but is generally accompanied by *P. bigeminum*, and sometimes by *P. argentinum*. It appears as a chronic affection, with high, sometimes intermittent, fever, severe anæmia, great debility and diminution of entire loss of appetite.

The examination of the blood of infected animals at the time when the disease was at its height, revealed a relatively large number of parasites in globules stained by the Laveron or Giemsa methods. These parasites were completely spherical, deeply and uniformly stained; they generally occurred only in one or two globules and were situated near the periphery of the latter. The parasite is certainly an *Anaplasma*, and studies being prosecuted by the writer will show whether or not it is identical with *A. marginale* Theiler.

Dr. Guth has observed coccus forms in Uruguay, which are probably to be referred to anaplasmosis; the latter disease was carefully studied at Sao Paulo by Dr. A. Carimi, Director of the Pasteur Institute at that place. In North America the existence of anaplasmosis has so far been definitely proved, though it probably occurs there, since Mc Smith and Kilburn have since their first publications dealing with the fever, coccus forms were found at the periphery of the globules.

Dr. Lignéres has observed the holes at the periphery of the globules or organs of the blood. The agency of *Margaropus* (the vector of *Pyopma*) is a far more serious cause than the vector of *P. argentinum* and *P. bigeminum*. The cattle die, sometimes resisting the disease for several months.

(1) See No. 810, *Ann. Zool. Path.*, 1913, 43, B. Jan. 1913.

inoculation against *Piroplasma bigeminum* and *P. argentinum* is little effect against *Anaplasma*.

Dr. Lignières insists on the necessity of adopting special sanitary measures to prevent the spread of anaplasmosis, which seems only to exist in limited areas in the north of the country.

- A Study of the Normal Blood of Carabao.

OSWALD, WILLIAM HUTCHINS: in *Philippine Islands Department of Public Instruction, Bureau of Agriculture, Bulletin No. 21. Manila, 1912.*

The writer used for his researches 25 buffaloes from 2½ to 6 years. Some of them were draught animals that had been immunized against rinderpest. The greater portion of the other animals had not been immunized.

The body temperature of the animals experimented upon was taken for several weeks before the examination of the blood began. The blood to be examined was always taken from a vein of the ear, after the ear had been well cleansed and dried with alcohol.

A short description is given of the methods followed in the investigations, as well as several tables of the results, which may be summarized as follows:

1) In the circulating blood of apparently normal buffaloes upwards of 10 years of age, an average of 6 057 520 red blood corpuscles were found per cubic millimetre of blood.

2) The average content of haemoglobin was 92.6 per cent.

3) In every cubic millimetre of blood there were on average 89 leucocytes.

4) The average specific gravity was 1.0532.

5) The ratio of the blood corpuscles to the plasma was 29.1 to 70.9.

6) The time necessary for the complete coagulation of the blood was 3 minutes 16 seconds.

7) The following five kinds of leucocytes were found:

a) Lymphocytes; average diameter 7.3 μ ; average number per cubic millimetre: 5049, or 48.5 per cent. of all the leucocytes.

b) Large single nucleus leucocytes; average diameter 10.8 μ ; average number per cubic millimetre: 484, or 4.6 per cent. of all the leucocytes.

c) Polynuclear leucocytes; average diameter 9.4 μ ; average number per cubic millimetre: 315, or 3.5 per cent. of all the leucocytes.

d) Eosinophil leucocytes; average diameter 11.5 μ ; average number per cubic millimetre: 115, or 1.3 per cent. of all the leucocytes.

e) Mastzellen; average diameter 11.5 μ ; average number per cubic millimetre: 115, or 1.3 per cent. of all the leucocytes.

147 - Use of "Vindobona Pulp" on a Large Scale for the Ensilage of Sugar Beet Pulp, in Hungary.

KOPPELY, GEZA : A "Vindobona pulpe" nagyban alkalmazása répaszclet bevé-
lésénél. — *Mezőgazdász*, Year XLX, No. 21, p. 177. Budapest, November 1912.

Three years ago the writer introduced Bouillant's "Lacto Pulp" to the farms belonging to the Hatvan sugar factory and employed it with success for the better preservation of the ensilaged beet pulps. M. He, Chief of the Station of Plant Physiology and Pathology at Magyaróvár was then occupied with the question, and described the good results of experiments of pure cultures in milk serum for the preservation of silaged pulps. This encouraged the Halvan sugar factory to use on a greater scale the "Lacto pulp" imported from France.

The favourable results of the first year's experiments induced the writer to inform the agricultural public of the use of the pure culture in milk serum and to call the attention of the sugar factories to this. He has since adopted the "Vindobona pulp" prepared at the Mikrobiológiai laboratórium in Vienna, which is also a pure culture in serum, legally guaranteed (1), and he reports briefly upon the results he obtained in 1912 with the ensilage of 1300 railway car loads of fresh pulp, on which "Vindobona pulp" was sprayed whilst being put into the silo. This treatment diminished by about one quarter the loss of weight due to excess of fermentation which in previous years had attained to 34 per cent. It also proved the quality of the pulp, which was more relished by the live stock than the untreated pulp.

In order to compare the loss in weight between the treated and the untreated ensilaged pulp the writer, assisted by M. Arthur Zaitz, chief chemist of the Royal Station of Biology and Stock-feeding, conducted the following experiment :

On November 24, 1911, two silos were filled : one containing 1649 cwt. of well pressed pulp treated with "Vindobona pulp", the other 1649 cwt. of pulp equally well pressed but not treated. On July 19, 1912, the first silo yielded 1247 cwt. and the second 1107 cwt. of pulp. Consequently the loss of pulp in the first was 388 cwt., or 23.8 per cent. and in the second 542 cwt., or 32.9 per cent. The loss of weight in the experiment was thus the same as that previously observed by the writer who warmly recommends all farmers to use the "Vindobona pulp" treatment.

148 - Some Diseases of the Hoof and the Horns in Sheep.

ARELL, T. — *Journal of the Department of Agriculture, Department of Animal Husbandry*, 1912, p. 10.

According to the writer, the diseases of the hoof and the horn in sheep are less frequent than in cattle. The diseases of the hoof are more frequent in the winter months, but the female sheep are more susceptible than the male.

(1) For details of the preparation of the "Vindobona pulp" see M. Buzsácz's article in *Közleked*, Year 22, No. 10.

we found that the F₁ generation arising from the mating of horned
and hornless sheep, by breeding *inter se* produced about 75 per cent.
and 25 per cent. hornless males, while among the female offspring
the F₁ generation 75 per cent. were hornless and 25 per cent. were

the writer states that Darwin's and Wood's data do not correspond to reality, for sheep according to the condition of the horns they may be divided into three categories:

- 1) Breeds with both males and females heavily horned (as the Horn and Lonk).
- 2) Breeds with the males only horned (Merino class; frequently males are found, and at times females with some signs of horns).
- 3) Breeds with both sexes hornless (Downs and many coarse-sheep, the most prominent of which are Lincoln, Cotswold and ar).

The writer has discovered by actual measurements that little appreciation exists in the size of the horns of Dorsets under similar conditions of feed and care. This, however, does not hold true for Merinos. They are most variable even within the same breed or strain. Some carry heavy, others short light horns, and in many breeds are hornless. All authorities on sheep concur that Merino ewes, unless, yet many practical Merino sheep raisers have admitted that a mere scab, or very short loose scur, may appear every year again from the horn pits of some Merino ewes. The writer himself has found at times a short hard knob protruding from the horn pits of Merino ewes. In 53 out of 128 American Merino ewes he found these excrescences, and 5 of these had besides scabs or short scurs. The writer seems to have a decided influence on the development of horns. This question, however, needs further investigation.

The writer has (in *Science*, N. S., Vol. XXV, No. 897) together with port, and combining the results of other investigators with those own breeding tests, formulated the hypothesis that horns in sheep nted a typical sex-limited character. According to this hypothe- re is an inhibitor in the sex chromosome which weakens or neut- the horn determiner; the hypothesis assumes further that the male sheep is heterozygous (simplex), strikingly different from the female while the female sex has two copies of the horn gene (duplex). The or for horn formation will be stronger in males than in females. The role of the sex chromosomes in the male. Further the effect of the sex chromosomes on horn formation is not strong in all breeds, or in some breeds it may be very strong. This is true in a vigorous determinant breed such as the Cheviot, where the horn deter- Hi (Ramboillet type) is dominant over the hornless (Hr) type. In the zygote the development of horns is determined by the presence of the H gene. In HrHi or one (Hh or Hr) the horn is much reduced, while in HH the horn determiner

are lightly horned, those with two heavily horned. Only the inhibitor occurring in the female zygote is capable of suppressing completely the development of horn when there is only one determiner (or H_1h); it cannot suppress it when it contains two determiners (or H_1H_1); the above mentioned determiners (H or H_1) for the formation of horn are lacking, no horns appear.

For his breeding experiments the writer used Dorset Horns, Friesians and South Downs, altogether 113 individuals. As common standard for the study of horns the ratio of circumference to length was taken. The length of the horn was measured from the poll to the tip of the point on the inside and once on the outside. An average between the two gives the length of the horn. The circumference is taken as close to the poll as possible.

The tables appended contain all the combinations of determiners theoretically possible with the matings made. Further tables give information on the crosses obtained and on the resulting F_1 and F_2 generations.

The results of the crosses can be well explained by the theory of the writer. He however does not consider the problem of the inheritance of horns in sheep as one finally solved; he hopes soon to be able to contribute further material towards its solution.

149 - Stock Census in Hungary for the Periods 1895-1911 and 1912

KOMAROMI, SANDOR. Haszonállataink. — *Politikai Héteszele*, Year XIX, Nos. 7-9. Budapest, December 29, 1912.

The Royal Hungarian Minister of Agriculture has just published a report of the stock census taken in the spring of 1912. The only noteworthy fact to be noted is an increase in the total number of pigs; other animals continue decreasing, as is shown by the following:

	Total in 1895	Per 1000 inhabitants	Total in 1911	Per 1000 inhabitants	Total in 1912
Cattle	1,852,644	338.6	1,603,945	306.6	1,596,000
Horses	1,431,000	109.6	1,095,400	81.0	1,095,400
Mules and donkeys	1,000,000	1.0	839,000	0.8	839,000
Goats	1,800,000	18.1	1,409,801	14.1	1,409,801
Pigs	771,900	351.3	716,854	421.5	716,854
Sheep	771,900	421.5	716,854	421.5	716,854

increases (+) and decreases (—) are as follows :

	1895-1911		1911-1912	
	On the total number	Per 1 000 inhabitants	On the total number	Per 1 000 inhabitants
.....	+ 354 679	— 25.6	— 147 319	— 13.3
.....	+ 4 333	— 15.6	— 41 431	— 4.0
and donkeys	— 3 512	— 0.4	— 1 815	— 0.1
.....	+ 44 991	+ 0.2	— 17 534	— 1.2
.....	— 30 946	— 52.5	+ 993 377	+ 47.9
.....	+ 170 935	— 50.0	— 529 665	— 35.3

From 1895 to 1911, the total number increased, except in the case of mules and donkeys. From 1911 to 1912, the pigs alone increased independently of the more or less correct statistical data it may be that, up to the present, the industry of cattle breeding as such has not shown signs of a capacity for improvement. A fresh proof is afforded by the stock census of 1912. The Ministry of Agriculture has made every possible effort to change the situation, but so far, breeding alone has shown favourable results, while an improvement in the breeding will only follow the accomplishment of the measures for extending and improving the pastures, distributing breeding stock at reduced prices and avoiding the loss occasioned by foot-and-mouth disease and other contagious diseases.

The total number of cattle in Hungary is not sufficient to meet the demand for milk, meat and exportation. Not only is the number of cattle in this country less than that in France (52 per cent. of the whole herd of cattle), in Germany (53 per cent.), in Italy (55 per cent.), in the United Kingdom (57 per cent.), in Sweden (58 per cent.) and in Argentina (51.5 per cent.), but it does not even remain stationary, having decreased from 44.2 per cent. in 1911 to 44.2 per cent. in 1912. On the other hand 1183 921 cattle were slaughtered in 1911, a reduction of 288 683 or about 20 per cent., on 1 472 604 in 1910. The total number of cattle for the butcher was 1 673 511 (39 per cent. of the total herd of cattle for the butcher in 1911 by 458 034, or 27 per cent.). It should have increased in 1911 by 458 034, or 27 per cent. (Goldmann). The total in 1911 was lower than that in 1910. In short, the live stock rearing industry is in a state of depression.

150 - Live Stock Breeding in the Province of Entre Rios, Argentina

1. La ganaderia en Entre Rios. — *Gaceta Rural, Mercantil e Industrial*, Year VI, pp. 223-227. Buenos Ayres, October 1912.
2. The Province of Entre Rios in 1911. — *The Review of the River Plate*, Vol. XX No. 1092, p. 1138. Buenos Ayres, November 1, 1912.

The Province of Entre Rios, with its slightly undulating surface traversed by the numerous, and to a great extent navigable, tributaries of the Paraná and Uruguay Rivers, is eminently adapted to live stock raising, owing to its topographic and climatic conditions, to the quality of its pastures and the good quality of its spontaneous grasses. Agriculture also, favoured as it is by the natural fertility of the soil, has made constant progress. In 1911, 1 985 732 acres were cultivated; of these

722 529 acres were under	wheat
880 747 " " "	flax (for the seed)
183 605 " " "	maize
210 772 " " "	oats
40 456 " " "	lucerne

Nevertheless the principal wealth of Entre Rios consists of live stock to the rearing of which 14 374 106 acres (out of the total surface of 18 711 238 acres) were devoted in 1911. The numbers of animals in that year were the following:

2 226 352	cattle
534 114	horses
17 845	asses and mules
6 720 487	sheep
23 238	goats
36 961	pigs

The above figures, if compared with the returns of the "Censime Agro-Pecuario" of 1908, show a falling off, due to the consecutive droughts of 1909 and 1910.

Among the various breeds of cattle, Shorthorns are preferred, on account of their precocity and of the excellent results attendant upon their use in the improvement of the native ("criollo") cattle; nevertheless in some parts of the province, and north they are losing ground and being replaced by the Herefords, which are hardier (especially as regards the holes in the ears) and "tristeza" or redhead and stand the drought better. The requirements of the latter breed being less exacting in the requirements of the former.

Among the various breeds of sheep, the Merino holds the first place. After many years of importation it has given origin to a variety which is well adapted to the climate and soil, and valuable in the improvement of the native breed, enabling it to compete with the famous and well-known breeds of the world. In the northern district the black-faced Southdowns are much esteemed.

among horses, Hackneys, Anglo-Normans and English race-horses and, in the Montiel district the ancient "criollo" horse, of which thorough-breds exist, is bred.

Among pigs, Yorkshires and Berkshires predominate.

The principal products of the above animals (excluding horses) are fat, or meat and wool. The dairying industry is of quite recent origin and is still unimportant. The exports consist either of living animals (to Brazil and Uruguay) or of salt meat. There are in the province "saladeros," which in 1911 dealt with 353 075 head of cattle, 10 000 horses and 9 449 sheep.

The crossing of the native breeds has only recently been commenced; however, already given excellent results. It is chiefly practised in the departments of Guauguaychu, Guauguay and Victoria, and in the part of those of Concordia and Uruguay, as this region is immune from ticks, which allows of Durhams being introduced.

The agricultural associations and the prize competitions that they hold, have contributed a good deal to the improvement in live stock raising and rearing.

The Encouragement of Horse-Breeding in Brazil.

apio do cavallo nacional. — *A Evolução agrícola*, Year IV, No. XI, pp. 18-19. São Paulo, October 1912.

The National Congress of Brazil, after having determined the conditions which entitle horse-breeding societies to receive Government subsidies, have decided to appoint an official Stud Book Commission pre-authorized by the Minister of Agriculture and entrusted with: instituting and keeping an official studbook for thorough-breds; issuing certificates; issuing the certificates and documents of animals which are to be entered; keeping registers of the latter; establishing the identity of such animals, and deciding *ex officio* all questions respecting them.

All imported thorough-breds are to be entered in the Studbook. It is obligatory that all thorough-breds born in Brazil should also be entered, if they are to enjoy the privileges granted by this law. Racing societies are obliged, under penalty of forfeiting the subsidies of the Federal Government, to organize, at all their race-meetings, competitions among bred animals of 2, 3, 4 or more years, striking districts from April to June, for animals of 3, 4 or more years, and from July to September for the end of the racing season. Further, they must organize competitions for imported horses, and for animals of 2, 3, 4 or more years, of not less than 5000 milreis (about £310) each. The winners of these competitions receive 5% of the sum of the prize money. The names of the winners must be entered in the Studbook. The Studbook Commission must examine the entries and conform to the provisions of this law with respect to the subsidies of the Government. The subsidy of 15000 milreis (about £937) is to be paid from the payment of federal taxes.

132 - The Breeding of Mules for the Market in Missouri.

CHANEY, WALTER S. - Market Mules in the Making. - *The Breeder's Gazette*, Vol. No. 25 (1621), pp. 1362 and 1366a. Chicago, December 18, 1912.

The mules foaled in the spring in the mule-breeding districts of Missouri run with their mothers on bluegrass (1) pasture till weaning time in autumn and during this time they get nothing besides mare's milk and grass. They are generally sold in autumn to traders, at prices ranging from \$3 to \$125 (£ 10 5 s to £ 25 15 s); the trader divides them into lots, selling the best forthwith, while the others are put onto bluegrass again, often get the run of corn (maize) stalk land also.

Only the better quality ones get some corn, oats and hay besides bluegrass and corn leaves. They are generally left out all winter. They are put on thick, shaggy coats in autumn. They are kept on bluegrass through the next summer, and wintered on this and corn stalk land.

As two-year-olds the mules are bought mostly by small farmers, break them and work them for the season; of the price of a pair (\$ to \$ 500, i. e. £ 80 to £ 100), the trader gets only a small part, the being secured by a promissory note for twelve months at 8 per cent interest, with a mortgage on the animals; this note he may sell to a banker who requires the money.

As three-year-olds, the mules are bought by dealers, who fatten them up before selling them in lots of twenty or more at Kansas City or St. Louis. There they are divided into several classes; sugar mules, or mules, miners, railroad mules, logging and turpentine mules, and others.

The sugar mules must show great quality, being thoroughly bred; they are 3 to 6 years old, and 16 hands or more in height, weigh 1175 to 1350 lbs.; they must have fine heads, sleek coats, clean legs and be without blemish; mares are much preferred.

Cotton mules are practically like sugar mules only smaller, 14.2 to 15 hands high.

Miners must be short legged and as heavy as possible; they may be from four up to ten years old; slight blemishes do not matter, as they are for slow hard work.

The log or turpentine mule is used in the forests of the southern States; size is the great requisite; in age they run from six to ten years.

Railroad mules are big and strong, with plenty of room behind the shoulders; horse and mares are of equal value for this purpose and slight blemishes and the holes are none.

133 - The Sugar Mule in India.

Low, C. F. - *The Sugar Mule in India*. Vol. VII, Part IV, pp. 337-342. October 1912.

Attention is drawn to the diminution in the number of cattle which is taking place in India.

(1) *Poa pratensis*: known as smooth-stalked meadow-grass.

writer does not consider that there are any grounds for this statement gives in support of his opinion, statistical information regarding cattle of British India (not including Bengal). Although it is to ensure accuracy in the enumeration of cattle in India, yet years past an ever increasing degree of accuracy has been secured. According to the writer, the probable error in most parts of India now much exceed 5 per cent. The following table shows the number of cattle in each of a series of selected years, also the cropped population throughout British India. To make this statement the figure of the initial year has, in each case, also been expressed and that of each succeeding year has been reduced to the proportion figure.

*Progressive increase in cattle, cropped area and population
in British India, excluding Bengal.*

(All figures save percentages are in thousands).

Year	1885/86	1890/91	1895/96	1900/01	1905/06	1909/10
Cropped area	128 283	138 265	135 487	146 708	155 452	170 862
Percentage	100	107.8	105.6	114	121	133
Number of cattle	53 921	73 375	78 581	84 434	91 130	94 903
Percentage	100	136	145.7	156.5	169	176
Population of nearest census	152 141	171 926	171 926	180 890	180 890	191 599
Percentage	100	113	113	118.9	118.9	125.9

It is clear that there has been an increase in the number of cattle, the increase being more rapid than that of the cropped area. The proof of this increase is not only derived from the striking difference between the number of acres which are cultivated, and as compared with the cropped area has been steadily increasing. The number of acres which are cultivated is also an increase in the number of acres which are more grass-land being brought under cultivation (Gola). The number of acres serving as grounds. The price of food is also increasing, and the price of cattle and fodder being high, the number of cattle is increasing. The breeding of cattle is carried on by the cultivators in their own fields, partly by professional graziers, and partly by large grazing

areas. In the first case, the breeding animals are ill-tended and the tendency is to breed an inferior animal, whose only recommendation is that it can live on a minimum of food.

More attention has, however, been paid to cattle of late in irrigated areas; and stall-feeding is here on the increase. The Government has wisely divided its forest areas available for grazing into grazing units and has fixed the number of animals that can be allowed to graze there.

An increase in the number of cattle can only be expected where stall-feeding is more extensively practised under circumstances which secure in all years an adequate supply of the necessary food. Lucerne and Egyptian clover (*Trifolium alexandrinum*), under favourable circumstances, will give a heavier yield of fodder than any other crop. Several varieties of millet give heavy yields of fodder under irrigation.

Irrigated pastures, which are already beginning to find favour, are another alternative. Oil cake, which is now usually sent to Europe, would be a valuable adjunct to bulky fodder.

Were it practicable to bring the whole cultivated area of the country under irrigation, the question of cattle-feeding would soon be solved. But as this is out of the question, it is necessary to consider the best method of dealing with areas where irrigation is not practicable. In such districts, millets and pulse are the main stand-by. In years of ordinary rainfall, the supply of the former is usually in excess of the demand; the surplus is habitually sold, or wasted. An efficient method of storage is required, so that the surplus stock of one year could be kept for the next and thus a continual supply of fodder would be ensured. Experiments at Berar have shown that *juari* stalks can be stored safely for more than a year, with little or no loss.

The grass in the Government Forests could be more economically used by feeding, than by grazing, and the policy of the Central Forest Department is now "Cheap grass and dear grazing." This department is throwing open forest areas, where no effective demand for grass exists, to capitalists who are prepared to maintain a proper number of cattle of good type.

The Civil Veterinary Department has done much of late year to control the inroads of infectious disease. In the year 1910-11, 36 cattle were inoculated, and 121 heads were treated otherwise than by inoculation.

154 - *Afrikaner*, Vol. I, pp. 6-7. The Union of South Africa, Vol. I, pp. 6-7.

The *Afrikaner* is unfortunately applied to all cattle, but there is a pure breed of *Afrikaner* possessing much prepotency and fixed in type. This breed owes its origin to, or is influenced in its breeding, even cattle imported to South

been found to be incorrect, for it is proved that pure Afrikaner existed in the latter country at the beginning of the 19th century, the first Devons were imported. However, it is not unlikely that is an indirect relationship. During the sixteenth century, Portugal had considerable trade with the Cape Peninsula; later, during the of the East India Company in the latter part of the seventeenth century, there was a good deal of traffic between the Cape and the Indian Archipelago, and probably cattle were brought from Portugal and to the Cape. About the same time as Portuguese cattle were shipped to the Cape, it is also probable that they were landed on the southern coast of England and therefore that they had some influence upon the breed in the counties of Devon and Somerset, from which the is of to-day subsequently sprang.

Although the Dutch colonists imported their black and white cattle from Africa, the writer does not think that the latter played an important part in the creation of the Afrikaner.

The Afrikaner was first and foremost a "trek ox", and before the days of railways, these animals were used in transport waggons; and a great influence on the breed, as active, strong oxen, uniform in type, colour and outline, were selected for these purposes.

The present Afrikaner cattle are red, with long head, wide-spreading horns, very muscular neck, powerfully developed shoulders, slightly rounded back, muscular hindquarters, and powerful legs, with medium-sized hoofs and even, round, deep toes. It is a hardy breed, suited to the African climate and excellent for draught purposes. They are slow in coming to maturity; the oxen are full-grown at from six to seven years of age and weigh 600 to 750 lbs. dressed carcass. The milk yield of the cows is low, though individual animals are fair milkers.

In the summer of 1912, an Afrikaner Cattle Breeders' Society was formed for fostering the breed and having it registered in the South African Cattle Book. The writer gives the standard of excellence and the scale of points then adopted. Some good illustrations elucidate the text.

Maize Distillery Residues as a Feed for Milch Cows: Influence on the Composition of the Milk.

FRISSE, ISTVAN. Friss és szárított moslék és tejcsiszum összetételére. *Köszlek*, Year 22, No. 83, pp. 2862-1, 1912.

Experiments carried out at the Central Veterinary School, Budapest, on the influence of the feeding value of the position of the milk have shown that the water taken by cows has no influence on the composition of the milk. Of the five watery residues tried, not one reduced the milk yield below the minimum.

In the 1912 experiments, the feeding value of the dried distillery residues, given to the cows in larger quantities than the dried, had any effect in diluting the milk.

In an 80 days' experiment, two six-year-old cows from the line not in calf, were used; during the whole period the milk-yield remained the same. The experiment was divided into three periods: 1) dry feed, wet feed, and 3) dry feed again. Each period was long enough to avoid after-effects of the previous one. Prior to the commencement of the experiment the cows had been on dry feed.

The first period lasted 12 days; each cow had 20 lbs. of hay, 1 lb. of barley, 1 lb. of pumpkin-seed cake and 4 ½ lbs. of dried maize lery residue.

In the second period, of 49 days, while the rest of the ration remained the same, the dry residue was changed to wet residue, the amount being the same to study the effect on the composition of the milk; the amount was: day, 55 lbs. per cow; next 13 days, 72 ½ lbs.; next 19 days, 60 ½ lbs.; next 15 days, 121 lbs.; last day, 60 ½ lbs.

In the third period, bran was given instead of the wet residue.

During the experiment the following were determined: 1) water consumed; 2) yield of milk; 3) specific gravity and fat content; 4) specific gravity and refractive index of the milk serum, this giving indication to dilution. The water consumed during the experiment was:

	Cow I. lbs.	Cow II. lbs.
Period I: dry feed	60.2	58.4
Period II: wet feed (average).	85.0	81.7
Period III: dry feed	53.8	49.4

Although the cows drank very little water during the wet feed period (no. I taking 5.7 lbs. and no II 2.6 lbs. per day on an average), the consumption of water in this period exceeded the average of the other periods by about 50 %.

The following are the figures for the composition of the milk during the experiment:

Period I: dry feed.

Cow I.				Cow II.			
Milk		Milk serum		Milk		Milk serum	
S. G.	% fat	refractive index	S. G.	S. G.	% fat	refractive index	S. G.
Max. 1.0332			1.0279	1.0334	4.40	41.4	1.0334
Min. 1.0320			1.0267	1.0317	2.80	40.0	1.0317
Av. 1.0326			1.0267	1.0327	3.81	40.5	1.0327
Period II: wet feed.							
Max. 1.0341			1.0341	5.12	41.0	1.0341	1.0341
Min. 1.0318			1.0318	3.20	39.5	1.0318	1.0318
Av. 1.0331			1.0331	3.69	40.2	1.0331	1.0331
Period III: dry feed.							
Max. 1.0346			1.0346	4.60	41.9	1.0346	1.0346
Min. 1.0327			1.0327	3.35	39.8	1.0327	1.0327
Av. 1.0336			1.0336	3.99	40.2	1.0336	1.0336

These results show that the wet feed caused no diluting of either the milk serum. Even when the cows were getting abnormal amounts of wet feed, the milk was held good: during the 14 days of heaviest feeding cow I took 11 and cow II 130 lbs. of the wet residue per 1000 lbs. live-weight; following figures show the composition of their milk in this period:

	Cow. I.	Cow. II.
Specific gravity of milk	1.0325	1.0334
Fat content of milk	4.22	3.49
Refractive index of serum	40.4	40.1
Specific gravity of serum	1.0269	1.0271

Cacao Husk as a Feed for Milch Cows.

1. The cacao husk used not only increased the milk yield, decrease being as much as 20 per cent.

2. At the same time, it increased the fat content of the milk volume as much as 20 per cent.

3. The cacao husk had little effect on the fat content taken as a whole, although this varied slightly, being sometimes greater and others less.

The writer states that Faelli (*Moderno Zootatro* 1898) obtained increased milk yield and fat content by feeding cacao husk; he considers that husks of much fermented cacao decrease the milk yield less than those of little fermented cacao, such as he used in his own experiments.

157 - Contribution to the History of Merino Breeding.

SCHULTE IM HOFE, A. Zur Geschichte der Merino-Schafzucht. — *Mitteilungen der Deutschen Landwirtschafts-Gesellschaft*, No. 50, pp. 690-692. Berlin, December 15, 1906.

1. *Introduction of Merinos into Europe.* — The Merino, whose origin is Asia Minor, travelled by Greece and Italy to reach Spain, whence it spread all over Europe. As early as the second half of the 15th century Edward IV brought some 3000 Merinos to England from Spain, but they did not succeed in permanently establishing them. Thereafter centuries later George III made further introductions, but the breed was again soon given up.

The first Merinos were introduced into France in 1659, but their distribution was limited. New attempts were made in 1752. In 1785 the King of Spain presented Louis XVI with 334 ewes and 42 rams, which formed the nucleus of the famous Rambouillet flock. Later, Spanish nobles presented the Empress Josephine with sheep from some of their best flocks.

Under Frederick the Great, in 1748, some Merino rams were imported into Prussia from Spain; in 1786 100 rams and 200 ewes were introduced. In 1802 400 rams and 800 ewes were imported and distributed among a large number of farmers. During the winter of 1815-16, 900 Merinos were taken from near Paris to Bornstedt near Potsdam; these sheep, 220 rams and 680 ewes — were the foundation of the Frankenthal (Brandenburg) breed, which was later increased by further importations from France.

The first Merinos to be introduced into Saxony were 92 rams and 100 ewes in 1765. In 1779, 270 more were purchased from Spain.

The Empress Maria-Theresa had 300 Merinos brought from Spain to Hungary, and founded the Manners flock. In 1784 the Emperor Joseph II brought over 1000 Merinos to found the flock of Manners in Austria, which was later increased by the addition of 2000 others.

In Sweden the first Merinos were introduced in 1715 and 1743.

2. *Introduction of Merinos into Australia and other British Colonies.* — The first Merinos were introduced into the Cape Colony by a Colonel under the Dutch Government in 1688, but the number did not exceed 1000, while in 1811 it had reached 11,000. In 1820, when the number of fine-woolled sheep was down to 8000, the Boers undertook wool-growing, and on various occasions imported Merinos from England; recently they have obtained them from the Cape Colony. In 1816 the exportation of wool

0 lbs., in 1832 66 000 lbs., in 1836 372 000 lbs., while in 1880 it had
ed 46 000 000 lbs.

ed 40 000 000 1257.

in the Transvaal and the Orange Free State, the breeding of fine wool-
keep, which was seriously upset by the war, has since looked up again,
to importations from the Cape. The total exports from the Union
with Africa in 1910 amounted to 120 million lbs., with a value of
0000.

John Mac Arthur was the first to see how well suited were the conditions in Australia for the breeding of fine woolled sheep. He crossed the sheep introduced by Captain Phillip in 1788 with 30 sheep imported from India in 1793 and others obtained later from Cape Colony. In 1804 Arthur brought several Merino rams with him from England. From period dates the development of sheep-breeding for wool in Australia. The number of sheep rose from 20 million in 1860 to 106 million in 1899, fell to 53.7 million in 1902; in 1906 there were 71 million and in 1910 102 million, with a wool export of 792 million lbs., worth £30 000 000. The breeding of fine-woolled sheep in New Zealand owes its origin to repeated importations of Merinos from Australia. The first year in which exports are mentioned is 1840; in 1858 the number of sheep had risen to 11 ½ million, and in 1910 to 24 million, with a wool export of 100 million lbs.

3. *Merinos in the Argentine.* — The first Merinos were introduced into Argentina at the beginning of the 19th century. In 1970 there were 11 million in the country, and the wool export reached 330 million lbs.

4. *Breeding of fine-woolled sheep in German Southwest Africa.*—In 1891 Hermann brought about 1500 sheep from the Cape to Kubub in German West Africa to start wool-growing; but the flocks were several times wiped out during native revolts. In 1908, however, their number 1000, and in 1911 32 000.

to allow breeding to develop rapidly it is essential to have springs
ently copious and persistent to establish fields of lucerne, so as to
de fodder in droughty years. The veterinary organization must be
to prevent infectious diseases becoming plagues. In the large
ree flocks there should always be enough breeding animals to supply
farms. Again, larger importations from Australia must be made, and
capital must be devoted to this industry.

Sheep-Breeding Experiments in

Annual Report of Alaska Agricultural Experiment Station, 1912, pp. 32 and 63-64.

From the experiments so far conducted in the Kodiak Experiment
it seems that sheep breeding in Alaska is profitable on the south coast
Alaska. In 1970, the Station purchased 100 purebred Lincoln and Cotswold
and a pedigree ram of each breed to establish a flock to run with the flock
the Cotswold kept for other experiments. The Lincoln and Cotswold
Long-wooled sheep do best in the State of Alaska; the short

close wool of Merinos and their crosses holds the wet, which seriously modes the sheep.

The sheep grazed on the mountains in the autumn and early winter of 1910. In the winter they were brought to the Station in excellent condition and were kept on hay and silage for the remainder of the winter. By and in bad weather they were brought into the barn, but otherwise kept out in an enclosure. They wintered very well.

At lambing time (June and early July) in 1911, there were still out of the 40 ewes, besides 20 lambs born in 1910. Three ewes died in spring of 1911 from a too rapid change from dry feed to grass.

In the summer of 1911 37 lambs were born, and 31 of these lived did excellently.

Alaka is attracting the attention of breeders from the United States in 1911 one breeder imported 500 ewe tegs, and other importations are being arranged.

159 - The Goat Shows in Goat Sheds Organized by the Chamber of Agriculture of Baden.

SABITTELL, J. E. Die Orts- (Stall-) Ziegenschauen der Badischen Landwirtschaftskammer — *Zeitschrift für Ziegenzucht*, Year XIII, Nos. 19-20 and 21, pp. 289-293, 310-311, 327-329. Hannover, October 1 to November 1, 1912.

On the initiative of the writer, the Chamber of Agriculture of Bad have adopted a plan for the improvement of goat-breeding in the Grand Duchy by means of goat shows held in the goat sheds. The whole show of the goat breeder is judged at these shows according to a scale of points.

The manner in which the animals and their sheds are kept is taken into consideration.

The scale of points is as follows:

I. — For the animals.

	No. of points
1. Breeding (fidelity to type, weight, descent, health)	0-3
2. Points (head, skin, hair, conformation of body, chest, width and depth of chest, back, belly, hips, limbs, general appearance)	0-3
3. Utility (good milking, good mother for breeding)	0-3
4. Evenness of all the	0-3
the holes a	
points for the animals	0-12

II. — For the other matters.

1. Condition (especially)	0-2
2. State of the shed	0-2
3. Milk test record	0-4
for points for these matters	0-8

prizes were given according to the verdict passed upon the animals : prizes were :

	Prize I.	II.	III.
For male goats	10 s.	6 s.	4 s.
For female goats	8 s.	5 s.	3 s.

If the breeder receives a minimum of 5 points under scale II, an additional 6d. for every such point can be added to the above prize. In 1912, the first goat-show of this kind was held. In some cases, animals were found to be badly fed and tended, but the writer hopes these conditions will be improved, and he concludes by stating the measures to be adopted for this purpose.

Chicken-Rearing on an Intensive System.

The Journal of the Board of Agriculture, Vol. XIX, No. 9, pp. 721-725. London, December 1912.

An example of intensive chicken rearing is provided by a small holding near London worked by Mr. F. G. Paynter; the holding is a grass of $3\frac{1}{2}$ acres, on fairly light and well-drained soil. Eggs of table quality were purchased and hatched in incubators. The chickens were in foster-mothers for the first six or eight weeks, and afterwards in runs up to the age of 12 or 16 weeks, when they were sold. The runs were 12 yds. X 100 yds., and held 100 to 120 chickens; in each run small Sussex chicken "arks" provided sleeping accommodation; these were on wheels and could easily be moved about. Mr. Paynter used methods of rearing previously tested by him for five or six years, incubation, attention and feeding were all carried out carefully and rationally. Only fresh material of the best quality was used for feed, and no cramming was practised. The quantity of food consumed during the season was: wheat 10 978 lbs., fine sharps 7 888 lbs., biscuit 3 257 lbs., barley meal 1 827 lbs., meat meal and green bone 1 586 lbs., bran 1 224 lbs., maize 703 lbs., rice 370 lbs., oatmeal 359 lbs., and fat 1 s., also about 2 000 lbs. of mixed chicken feed.

It had been intended to start incubation in December, so as to sell first consignments of chickens in April, when prices are good; but various reasons it was delayed, and hatching did not begin till the 13th February. Incubation was stopped on the 28th.

Altogether 2 192 chickens were sold on the 28th and November 1912 at a total of £301 5s. 3d. The following follows:

	£	s	d
Purchase of eggs (two do each)	31	13	1
Purchase of day-old chickens (including apparatus)	4	19	0
Oil for heating	4	12	9
Food	142	4	3
Occasional outside labour	14	6	2
	£197	15	3

There was thus a margin of £103 10s. for the labour of the holder, rent, deterioration of equipment, risk and interest on capital; there was also the value of the manure, which was regularly swept.

The cost of the incubators, fencing, houses and all utensils ran £150 odd; a further £50 to £100 would be required as ready money purchasing eggs and food, before the returns began.

An essential feature of the management was that no adult birds were kept; this enables the holder to devote all his attention to the chick and greatly reduces the risk of outbreaks of infectious disease.

The Board of Agriculture has arranged with Mr. Paynter to run on his system this year in Cheshire, as a demonstration to the small holders in that county.

161 - An Export Trade in Eggs. Views of the South African Commissioner.

The Agricultural Journal of the Union of South Africa, Vol. IV, No. 5, pp. 748-751, November 1912.

The imports of eggs into the United Kingdom for the year totalled over 19 000 000 great hundreds (120 eggs), value £7 967. The following are the figures in regard to the ten chief countries of origin.

Country	Quantities in great hundreds	Total values	Value per great hundred
		£	s. d.
Russia	10 041 890	3 796 408	7 6 1/2
Denmark	3 992 986	2 030 607	10 2
Austria Hungary	1 022 554	428 869	8 4
Italy	771 107	366 859	9 6
Egypt	687 335	222 853	6 5 1/2
France	652 036	303 515	9 3 1/2
Netherlands	577 364	282 805	9 3 1/2
Germany	545	233 142	8
Sweden	189	157 067	9 1
Morocco	50	84 967	7 10

In 1911 the Commission estimated that 19 000 000 great hundreds of eggs were exported to the United Kingdom, which, however, realized 11s. per great hundred, the average price of any of the imported eggs.

the price for the year was about 8s. 4½d. per great hundred, the low-
est being 5s. 4d. per 120 for Chinese eggs.
South Africa imports considerable quantities of eggs, but this import
is practically limited to the months between February and August,
but it might be possible during the rest of the year to satisfy the home
demand and to supply an export trade.

Eggs imported into the Union of South Africa during the year 1911.

	Quantity	Value
	—	£
January	14 400	60
February	495 446	2 163
March	3 405 839	15 072
April	3 699 190	14 302
May	4 623 564	15 813
June	3 835 056	7 701
July	650 810	1 928
August	78 252	220
September	5 000	27
October, November, December	nil	nil
Total	16 807 548	£ 57 286

There are several large areas in South Africa where eggs and dairy
products can be produced cheaper than in other countries which export
these articles. The reason why these commodities are not produced
in large quantities in South Africa is due chiefly to the difficulty of collecting
the produce (the population being very widely scattered) and of transporting them.
Countries which export eggs are closely populated and often have
large quantities of food-stuffs. Still the advantages of a speedy and cheap collec-
tion are so great as to enable those countries to compete on the large mar-
ket of the world.

On account of the want of large markets, the South African agricul-
turalists have had to confine their efforts to the production of non-perish-
able products such as wool, mohair, ostrich feathers, wattle bark, and
maize. During recent years, however, they have, with the aid of
refrigeration in ships, been enabled to export their fruit, and a high indus-
try has thus been created. Trials have been made of the production of butter
made with satisfactory results, which may open up an export trade
which could be created during the winter months when they are plen-
tiful in South Africa. The question of the production of eggs probably be solved
by the aid of co-operation. The Union-Castle Steamship Company has been
able to carry some trial quantities of eggs from South Africa in a special
cold chamber, at 50s. per ton measurement, and the industry will be occupied.

*Prices of eggs on the English market from November 1911
to January 1912.*

Country of Origin.	Price per 120 eggs		
	Average	Highest	Low
	s d	s d	s
England.	17 11	23 0	11
Russia.	9 8 ¹ / ₂	12 0	7
Denmark.	15 10	22 0	10
Hungary.	10 0 ¹ / ₂	11 9	7

For the English market the colour of the eggs, whether w/ brown-shelled, is a matter of indifference, provided that they a uniform colour and size in each box. The eggs must be clean *not washed*, and of a fairly good size and weighing from 13 to 16 trade hundred (120 eggs).

The writer has made himself acquainted on the English with the best methods of packing eggs adopted by the chief exp countries, and recommends the cases used for the import of egg South Africa. These are lined with brown paper tarred on one and very dry oat straw. The eggs are packed in layers of five to sixteen and seventeen alternately, embedded in dry oat husks. Be each layer of eggs and the next one there is a double sheet of news/ oat straw and more newspaper. Four layers of eggs form a case. writer recommends placing a double division in the middle of the so that they can be divided by sawing into two half cases which an to small dealers.

162 - Mendelian Methods applied to Apiculture.

SLADEN, F. W. L. in *The Canadian Bee Journal*, Vol. 20, No. 12, pp. 357-367. 1
ford, Ont., Canada, December 1912.

The study of Mendelism the bee is hampered by several sp difficulties. Firstly mating not be controlled in the ordinary. Then there is the parthenoic production of the drone. Th the honey-bee is a highly sp/ animal, and varies very little. T is some variation in size, colour, and races being smaller than thos the west, but apart from the colour of the upper or dorsal side of abdomen is the only variation that varies strikingly.

In the workers the Abyssinian bee and in the s official varieties known as the yellow extends over the th basal segments and the basal part of the fourth segm. The scutellum on the part of the thorax is also yellow.

goldens, with the fourth segment entirely, and the fifth segment less, yellow have also been bred, but it appears that they do not rue. In Italians the three basal segments are bordered at the with black and the scutellum is darker. Italians from the Swiss have the black bands wider than the Italians from the Ligurian while Cyprians have them narrower. Races with the abdomen black occur in Britain, France, Germany, Malta, and other places. In years the writer has been engaged in breeding a golden bee known British golden bee. This bee was extracted from crosses between blacks, Italians and American goldens. The golden character is isolated, and thenceforward it was found possible to maintain the golden breed, though many of the queens were mated with and produced hybrids. No attempt was made to increase the area of golden colour, which in the queen extends much further back than the worker. The factor or factors that produce a half yellow and black abdomen in the worker produce an almost entirely yellow the queen. There is no difference in the gametes; the difference is a fluctuation in the zygote caused by a difference in the food in the larval stage. Since the work of breeding British goldens in 1902 a large number of pure golden queens have been bred; 1500 of them were kept until their young workers were hatched, and were made of the colouring of these. They were golden and adiate. Not a single black worker was seen. Most queens produced a considerable proportion of each type, but some produced all golden and some all intermediates.

It was evident that the queens that produced all goldens had been by a pure golden drone; in fact the most numerous golden families from the matings that took place at the end of each season, when the drones in neighbouring apiaries had been killed off, and from matings that took place in cold and windy weather and therefore to the apiary.

It was also reasonable to believe that the intermediates were the result of the union of the golden queens with pure black drones (out of five were mated at a spot nearly two miles from the apiary four produced intermediates and one about nine intermediates to one golden). Without the queens that produced goldens and intermediates had mated heterozygous drones. The proportion of the two types of workers is considerably: from

intermediates: golden :: 9:1 (one golden)

intermediates: golden :: 1:30 (one golden)

common proportion was

intermediates: golden :: 3:7

The proportion of goldens to intermediates was found to be the in the queen progeny as in the worker progeny. The worker offspring of about 30 golden queens were mated and in every case they came 2 golden, intermediates blacks, thus proving that segregation of golden from black takes

place. The proportion of the three forms varied in different cases, the intermediates were usually in excess of the golden and the black. In many cases almost every degree of coloration between golden and black appeared, but the bees of the same shade were in different proportions in the various offspring.

The interpretation of the results obtained is rendered difficult when not knowing the drone fathers. Nevertheless they indicated Mendelian inheritance. The appearance of an almost continuous series of intermediates shows that probably more than one factor is here at work.

As a conclusion of practical value, it appears from the foregoing that if the characters that are wanted depend upon the heterozygous state of the heterozygotes, the way to get them is to breed together the pure homozygotes. Thus from the union golden \times black all intermediates are got, whereas from the union intermediate \times intermediate only a proportion of intermediates are obtained.

The union between golden queen and black drone is practically maintainable on a large scale, and their offspring possesses certain qualities that are very desirable. The workers show themselves vigorous, hard and industrious; the intermediate is considerably larger than the golden (in both queen and worker) and slightly larger than the black. The colonies are very populous, the golden queens being more prolific than the black; their temper is usually good, though it becomes hotter in later generations when the black colour predominates.

As it is not possible in the case of bees to control matings by means of isolation, the only way of obtaining desirable characters seems to be fixing them by selection in the queens. A desirable character may appear not in the queen but in the worker (for instance, exceptional industry). For such characters the colony must be considered as the unit.

It is generally admitted that the drones are produced parthenogenetically, and it is proved that a queen which has not been fertilized produces drones only. But are *all* the drones produced by a fertilized queen the result of parthenogenesis? Perez in 1878 thought not, because in examining 200 drones produced by an Italian queen fertilized by a French black drone he found 149 which he thought indicated hybridity.

If it is true that drones are always produced parthenogenetically by the queen, provided her gametes be pure, must produce pure drones whatever kind of drone has fertilized her. The writer has bred drones from about half-a-dozen of his golden queens every season for some years. Some of these golden queens were producing only golden workers, others produced certain proportions of intermediates, others only intermediates. The drones from the golden queens producing all golden workers were all golden, as were also the drones from most of the queens producing some or all intermediates. But two of these queens produced certain proportions of intermediates.

In trying to explain this remarkable result one is apt to suspect that the queen was not pure, but that the golden gametes, but the facts that the queen had the scutellum of the abdomen almost to the tip of

at a queen thus colored had never been known to produce a black
 to oppose this view. In conclusion the writer does not consider
 his observation seriously endangers the theory that the drone is
 produced parthenogenetically, but is of opinion that cases such
 as should receive the fullest investigation.
 Italian bees, the workers all come perfectly true to a color pattern
 like that of the cross between English golden and black, while the
 drones, on the contrary, show immense variation. The question arises,
 are these differences in the queen mere fluctuations or do they stand for
 in the gametes which do not manifest themselves in the workers?
 It would be interesting to ascertain if Mendelian rules are followed
 in the inheritance of the bands of short white hair, which, in the Italian
 Carniola, is highly developed on each segment, except the first
 and last, and which is but feebly developed in the English black bee.
 Italian bees enjoy justly a world-wide fame, but in England, owing
 to the summer climate not being warm enough for them, the Italian-
 English half-breds usually produce better results. One of the best
 qualities of Italians is their resistance to the disease known as European
 Brood (1), and it would be well worth while to try to discover
 whether this quality is shared by the Italian-English half-breds. A
 might perhaps be bred to resist that still greater scourge the Isle
 ofight Disease (2).

Notes on Bee-keeping in Australasia.

Lawrence, L. L. in *The Agricultural Journal of South Africa*, Vol. IV, No. 5, pp.
 5747. Pretoria, November 1912.

This paper is the result of data and information collected during
 time in the Commonwealth.

The first thing that struck the writer was the huge "takes" of
 in Australia, no less than 200 lbs. being considered as fair, and this
 up to 500 colonies are kept. The chief nectar producing plants
 are the various gum and boxwood trees. Experience has shown that
 the Italian and Golden Italian bees have been found to be the best
 adapted to the requirements of the bee keepers, and large numbers are reared
 locally; as much as 15s. is paid for a select tested queen of this var-

In New South Wales the hive which has practically been adopted
 as standard is the Longworth. In Victoria an Act has been passed,
 going into force on the 1st of January 1913, prohibiting the keeping
 of anything but moveable frame hives. A similar law was en-
 acted in New Zealand six years ago, under the Apiaries Act, 1907, requiring
 the bee-keeper to give notice to the Government Secretary for Agriculture of any
 colony found to exist in his apiary. If the colony is then paid by an inspector,
 either orders that the disease be destroyed or leaves in-

1 See No. 1202, B. Aug.-Sept.-Oct. 1912.

(Ed.).

2 Caused by *Nosema Apis*. See No. 1849, B. Aug.-Sept.-Oct. 1912.

(Ed.).

structions for their treatment. Within six months of the passing of the Act no bee-keeper was allowed to keep his bees in other than frames and further, should the inspector discover a hive where the frames were not readily removed, he has the power to order that the bees be transferred to another hive within a specified time. By this means they are in time to get rid of foul brood and other bee diseases.

Large extractors carrying six and eight frames are in general use and larger ones driven by small engines are also made. A firm in South Wales has patented a machine to dispose of the cappings. The machine is really one tank inside the other, the space between being occupied by water kept at the proper temperature by a paraffin stove placed underneath. The cappings, as they are cut from the frames, fall on the grate and then to the bottom of the inner tank, where the wax melts and flows out by the adjustable outlets, the upper of which delivers pure wax, which is lighter than the honey and other impurities.

The honey is put up in tins ranging in size from 1 lb. up to 60 lbs. Tins of 56 lbs. are generally used for export. The wholesale price of honey in Australia in 56 lb. tins is usually about 2 $\frac{3}{4}$ d. per lb., but at that figure apiarists are able to make a good living out of bee-keeping.

To provide an outlet for such large quantities of honey, the Government has instituted a Co-operative Union in which the farmers have shares. The Union, besides honey, receives also other produce for export. Each farmer delivers his produce at the stores and at the same time receives the wholesale market price, less a small commission for working expenses. The Union controls the market, securing supplies when they are wanted and preventing overstocking.

In Victoria, a strong association known as the "Victoria Apiculture Association" exists, the special function of which is the holding of an annual conference. The executive have recently been successful in obtaining reduced railway charges for honey and bee appliances over Victorian Railways.

In Victoria a disease has been discovered, which appears to be limited to that State and which has been termed D. T. or "disappearing time." It is believed to be due to malnutrition of larvae, bee paralysis, and *sema apis*. As the name suggests, the bees disappear rapidly, but more dead bees are found round the hives than would be found among any healthy stock.

The other bee diseases known in Australasia are foul brood and dysentery, but these cannot be described as being very prevalent.

164 - The Fungi of the B.

BETTS, ANNIE, D.: *The Fungi of the B.* *Journal of Agricultural Science*, Vol. 7, No. 4, pp. 129-161, London, December 1, 1912.

A short account of the previous work that has been done from 1854 to 1912, on the fungi present in bee-hives; and some questions arising from these results are discussed. A general description of

ions prevailing in the hive, and of the distribution of fungous growth are given. The following twelve fungi are described and illustrated: probably confined to the hive: *Pericystis alvei*, *Oospora favorum* (common species).

Adapted to hive-life, but not confined to this habitat: *Gymnosporium*; *Eremascus fertilis* (not common).

Common, but not specially adapted to life in the hive: *Penicillium*, *Aspergillus glaucus*, *Citromyces subtilis*, *C. glaber*, *Mucor* (chiefly, if not exclusively, found on dead bees).

Occasionally present: *Aspergillus nidulans* (probably absent from stocks); *Sordaria fimicola* and *Gymnoascus ruber* (coprophilous).

The literature cited, including 30 papers, is appended.

Fish-Breeding in the Streams of the Domanial Forests of Hungary.

COFFY, GYULA. A-m. kir. kincstári erdősegek halasvizel. — *Erdészeti Lapok*, 1912, Parts XIX, XX, XXI, XXII and XXIII, pp. 779-799, 834-853, 898-908, 934-944 and 970-976. Budapest, October 1 and 15, November 1 and 15, December 1, 1912.

In Hungary, most of the domanial forests are situated in the west and north of the country; there are also the principal groups of plain (Alföld). According to the ministerial report of 1910, the area of the forest administration amounts to 3 214 853 acres. Under natural conditions obtaining in Hungary, which is very well supplied with water, the streams form a large network within these estates and the profits derived from the fish, etc., which are under the charge of the forest administration, form an important part of the revenues of the State.

According to the data collected by the Ministry of Agriculture, the area of the area belonging to the Treasury which can be employed for fishing purposes is 43 493 acres. The streams which are known and which have a total length of more than 3000 miles. The area which is administered by 124 forestry officials. The right of fishing in the territory does not belong exclusively to the Treasury, but is shared by the owners of properties adjoining the streams. As the Treasury reserves the right of fishing both on the plain and in the mountain streams, the streams over which it has control include all the species which usually inhabit fresh water in Hungary, notably the following species: perch (*Perca fluviatilis*), pike-perch (*Lucioperca sandra*), *Aspro communis*, (Acerina cernua), miller's-thumb (*Cottus gobio*), Cobius marmoratus (Lota communis), carp (*Cyprinus carpio*), Prussian carp (*Carassius vulgaris* and *C. gibelio*), tench (*Tinca vulgaris*), barbel (*Barbus haasi*), Petény barbel, gudgeon (*Gobio fluviatilis*), bitterling (*Rhinogobius*), bream (*Abramis brama*), (Alburnus lucidus), Idus (Leuciscus rutilus), minnow (*Phoxinotus phoxinotus*), loach (*Cobitis taenia*), Chondrostoma nasus, sheatfish (*Platypharodon*), grayling (*Thymallus*), trout (*Salmo trutta*), sea trout (*Salmo trutta*), shad (*Alosa* vul-

garis), eels (*Anguilla*), sturgeon (*Acipenser sturio*) and lampreys (*myzon*).

The number of fish in the streams varies according to the prevailing conditions; as a rule there are few and in some streams none. The cause of the decrease is chiefly a too great extension of fishing rights. In face of these regrettable circumstances, the forestry administration is pursuing a commendable activity, devoting its whole care and efforts to the subject of fish-breeding. There are at present 37 establishments for the artificial incubation of trout eggs; these institutions work under the direction of the administration of the domain and are mostly furnished with modern apparatus, the number of the latter being 279. In addition there are 6 breeding ponds for rearing trout fry, which remain open throughout a summer. Thanks to these measures 1 470 000 eggs of river trout and rainbow trout have been hatched in the above-mentioned apparatus in the course of the year, and from these, 972 000 young were transferred to the ponds.

It should be noticed, that the administration of the Domain is supported by the Royal Fishery Inspection, which has its seat in a bureau attached to the Ministry of Agriculture. This bureau has fixed the conditions for the establishment of Stations for artificial incubation, breeding ponds, and has distributed gratuitously the incubation apparatus and the trout eggs. The cost of these installations under the administration of the domainial forests is about £833, estimating the average expense of building the stations and making the ponds at £16 10s. and that of the apparatus at 8s. 4d. each. The whole number of which have recently been hatched artificially represents a sum of reckoning 3s. 4d. per thousand eggs.

The streams of the Royal Domain are turned to account in different ways. Most of them are let with the land, but some of them are not; sometimes the fishing rights are let with the shooting.

Fish and fishing licences bring in annually the sum of £22 37 650 acres. Nevertheless, seeing that of all the domainial land watered by streams, 5841 acres are at present not utilized, and that their utilization would greatly increase the revenue, it would be interesting to know the value they represent. In order to make this estimate, it is necessary to classify the extent of these streams according to the principal species where the different fish are found:

	Area, in acres	Actual revenue
1. Bream district	33 021	25. 16
2. Trout district	5 345	15. 118
3. Barbel district	5 127	8

Thus if these streams were utilized and the average rent of the streams was obtained, taking the minimum sum, in this case the revenue from the domainial forests would be:

	£
Streams with bream	3483
Streams with trout	517
Streams with barbel	180
Total	£4180

The annual return from trout streams is very variable. According to the data collected by each of the Central Forestry Bureaus, it varies between 3*d.* and 5*s.* 7*d.* per acre. Taking these figures as a basis, it is estimated that these trout streams might bring in an additional sum of from £1460. The following calculations show how the revenue from the trout streams could be increased.

It is well-known that, under normal conditions (presupposing some compensation being paid to the streams and their stock of fish) a stream of one acre can produce from 23 to 39 lbs. of trout. Taking 2*s.* per lb. as the minimum sale price of the fish, the net revenue from one acre of trout stream would average about £3; thus the revenue of the 5345 acres of trout streams would be about £16 000; this sum could even be increased in a few years, if the Administration continued its present exertions in promoting and extending systematic breeding of fish.

FARM ENGINEERING.

- Trial of a Dodenhof-Meyer Manure Distributor.

REX, Jos. Prüfung eines Düngereilegers System Dodenhof Meyer. — *Wiener Landwirtschaftliche Zeitung*, Year 62, No. 100, p.1151. Wien, December 14, 1912.

Two manure distributors on Dodenhof-Meyer's system were sent to be tried. One was provided with an interchangeable plough-share, the other lacked. Their weight was 12 lb. 2 oz. and 11 lb. respectively. They consist of a screw-shaped steel plate with a shaft by means of which the apparatus is fastened to the beam of the plough instead of the coulter. Its action consists in rubbing the fertilizer into the furrow made by the plough.

From the experiments made it appears that the apparatus increases the resistance to traction of the plough by 44 to 57 lbs.

The quality of the work performed was excellent in every trial. The manure was completely and uniformly ploughed in, and it seems that the apparatus will also be useful in dealing with green manures.

- Tapping Rubber Trees by Electricity.

The *India Rubber World*, Vol. XLVII, No. 3, pp. 142-143 + figs. New York, December 1912.

George M. von Hassel has devised an apparatus for tapping rubber trees by electricity. Upon the trunk of a rubber tree is placed a piece of sheet-iron about 5 ft. long, 5 in. wide, with the two sides folded back against the tree to a thickness of about 2 in., constituting a hollow

channel of sheet-iron. This hollow channel is divided into a series of 15 to 30 sections; the number of sections depends upon the number of days the apparatus is to be worked. Each section has a mechanism for the extraction of the latex from the rubber tree and a receptacle for giving the flow, which also contains an acid preparation for the coagulation of the latex. When working *Hancornia* and *Castilloa* trees, plants provided with longitudinal canals, in which the latex coagulates spontaneously in threads, are used instead of the receptacles for gathering the latex, and the product thus obtained is known as "Seramby".

The method of operating is as follows: The above described device is fastened against the rubber tree. If it is a small tree there will be one of them; if it is a large one there may be as many as nine circling the trunk and about a hand-span apart. This apparatus is connected by an insulated wire with similar apparatus on all the other trees to be tapped, and with a central station which is equipped with electric power. The machine devised by the inventor makes it possible to send the electric current so that it will set each section in motion separately. When the first section is at work the latex oozes out and flows into the receptacle immediately beneath. The next day — or preferably 48 hours later — the current is turned on to the second section, which in its turn taps the tree and so on for all the sections. After 30 or 60 days no more remains to be done but to collect all the rubber at one operation.

168 - Spraying Machines in Malaysia.

ALEXANDER, D. C., JR. in: *Daily Consular and Trade Reports*, 15th Year, No. 2, 1143. Washington, December 3, 1912.

There is a large market for spraying machines in the Federated Malay States, and the writer believes that there is also a good demand for the same machines among the rubber growers in Java, Sumatra, Ceylon.

On practically every rubber estate in the Federated Malay States several spraying machines are in constant use, both for spraying the rubber trees and for spraying and killing the lalang grass, or weed. This grass, which seems to spring up as soon as the jungle is cleared, sinks its roots so deeply as to interfere seriously with the root nourishment of the rubber trees. Indeed most planters consider lalang their greatest enemy, and large sums are spent annually in combating it.

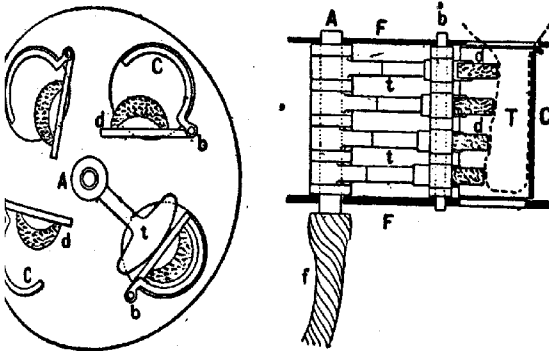
When the young trees are set out they are spaced about 20 ft. apart and the lalang is dug out along the lines with "chukohs" (hoes). As soon as the trees are fairly started, spraying with a herbicide is usually substituted for the more expensive hoeing, though the usual chemical applied does not kill the roots and have therefore to be applied at frequent intervals. The herbicide most generally used is arsenite of soda.

Two or more types of spraying machines are used on the rubber estates. The larger ones, for spraying lalang, are mounted upon small trucks drawn by horses or coolies. The most popular machine for spraying lalang is a knapsack, as it can be used by a coolie upon steep hillsides where a truck could not go.

A Milking Machine at the Central Competition at Amiens.

PAS, G. Une Machine à traire au Concours Central d'Amiens. — *Bulletin de la Société Agriculteurs de France*, December 1, 1912, pp. 378-379. Paris, 1912.

At the last Central Agricultural Competition held at Amiens, the firm "la Galakton" showed a milking-machine of which the principle is diagrammatically shown by our figure. The apparatus is almost in the shape of a flat cylindrical box, of which the top and bottom are formed by two plates F, each furnished with four large holes arranged in the same manner as the teats on the cow's udder. Between the plates F, perpendicular to them, are four hollow half-cylinders, C, of aluminium, against the concave surfaces of which the teats are placed; to extract the milk, each element C is provided with a series of four or five fingers, *d*, each ending in a thick cushion of rubber; the fingers



on an axis *b*, parallel to *C*, from which it is held away by a spring. At the centre of the apparatus, there is an axis *A*, which is revolved by a flexible tube *f* connected with any part of a machine with a rotatory movement; this axis *A* bears four or five rods, *t*, which during the rotation successively each of the fingers of the milking elements *C*. As shown in the right-hand portion of the figure, these different fingers are superposed exactly one over the other, but are slightly out of line, so that the one at the highest level works first, and the others rapidly follow one after another. Thus the teats in the half-cylinders *C* are pressed near their insertion on the quarters, then progressively up to bottom, towards their extremities; this process extracts the milk without any need of mechanical suction. There are also fairly simple adjustments for the adaption of the machine to differently shaped udders, and a harness, rapidly adjusted to the animal, supports the machine while at work.

170 - Testing the Wallace Milking Machine.

HANSEN. Prüfung der Wallace-Melkmaschine. — *Wissenschaftliche Rundschau*, 13-14, pp. 49-56. Supplement to *Georgine, Land- und Forstwirtschaftliche Zeitung*, 5, No. 100. Königsberg, December 14, 1912.

During six months, Dr. Hansen has been making experiments with the Wallace milking-machine at the Agricultural Institute of the Albertus University at Königsberg; the results obtained are incorporated in the following report.

The writer first gives a description of the apparatus and the method of working the machine. Then he proceeds to a description of the experiments and discusses the data obtained.

The experiment lasted from October 3, 1911 to April 4, 1912. 11 different cows were experimented upon. None of the animals showed any objection to being milked by the machine. The first few days was not possible to milk the cows dry, but already on the fifth day, strippings obtained by hand were only 4 oz. per cow, not even 2 per cent of the total amount. In the week of October 13-19, the strippings in 119 milkings amounted to from 0 to 8 oz. in 108 cases, and to more cases. It is very important that the udder of the cow should be milked at the close of machine-milking; by this means the cow can be milked dry by the apparatus.

The strippings, obtained by hand after using the machine, show a higher fat-content than that of the rest of the milk. The average proportion is 2:1; thus milking dry is of great importance. Of 210 milkings in the week of November 23 to 29 the strippings obtained by hand were in 162 cases from 0 to 3½ oz., in 23 cases from 4 to 5 oz., and from 7 to 8 oz.; but in the four last cases 11, 14, 18 and 21 oz.

The milking machine has no bad effect upon the amount of milk or on the fat-content. If the strippings are not removed by hand, the quantity appears at first slightly to decrease; the cow however recovers its full milking powers after a few days, when it has become accustomed to the new conditions.

It is an important fact, that in isolated cases the strippings are considerable and that usually the preceding and subsequent milkings are satisfactory. The cows depend somewhat upon the stripping by hand; they yield the milk regularly when this supplementary process is omitted. Machine-milking was practised exclusively from January 10 to April 1912 and no diseases of the udder made their appearance; also in no case was a rapid fall in the milk yield noticeable.

One person can work three machines at once and is able to obtain from 400 to 450 lbs. of milk from 20 cows in an hour.

For the apparatus to work well, it must be kept scrupulously clean, which entails absolute cleanliness in the cow-shed; further, the animals themselves must be rightly handled.

According to the writer, hand-milking with really good operators is however the ideal method, for a good milker is able to treat each cow individually. But skilled and conscientious persons can milk a

ughly, even with a machine, and up to a certain point, not lose of the individual requirements of each animal.
The Wallace milking-machine is therefore much to be recommended dry work; its performance is equal to the work of the average milk-d far superior to that of an inferior operator.

RURAL ECONOMICS.

The Standing Working Capital in one Hundred Farms in Silesia.

VOLTE-BÄRUMINGHAUS. Das stehende Betriebskapital in hundert landwirtschaftlichen Betrieben Schlesiens. — *Veröffentlichungen der Landwirtschaftskammer für die Provinz Schlesien*, Part 10, pp. 1-30. Breslau, 1912.

utilizing himself of the abundant material at his disposal, the writer determined in this paper the amounts of living and dead stock which ber of Silesian farms show in their inventories and has drawn the sions that result from the averages of these figures.

re material was supplied by the book-keeping bureau of the Cham-Agriculture for the province of Silesia. The inventories of all the d farms here considered were drawn up by the writer himself. the first part the principles adopted by the book-keeping bureau valuation of the agricultural inventory are set forth, so far as they to the so-called standing capital, which comprises the live and tock inventory.

the second and third parts the writer has shown by figures the in-that the intensity of farming, the size of the farm and the distance re railway have on the amount of living and dead stock in the ry; he has further determined the ratio of the numbers of draught nd of productive stock, as well as the figures of the total dead stock l to one unit of draught stock.

om the annexed table, in which all the averages found by the writer lected, the following results are obtained.

- 1) The average number of head of all live stock expressed in head cattle amounts to 21.27 per 100 acres, worth £320 2s. 6d.
- 2) The average number of draught stock amounts, per 100 acres, head, worth £88 7s. 6d.
- 3) The average number of productive cattle, expressed in head cattle, amounts per 100 acres to 12.46 head, worth £189 17s. 6d.
- 4) As the farming grows more intensive the average number and the whole live stock, and especially of draught animals, increases.
- 5) The number and value of the whole live stock diminishes with ease of the size of the farm (the diminution in draught animals the least).
- 6) With the increase of distance between the farm and the railway rege number of draught animals diminishes slightly.
- 7) The average number of draught animals is 46.54 per cent. number of productive stock, and 27.6 per cent. of the total live

Average standing working capital on 100 farms in Silesia.

Class of farm	Total live stock (in head of large cattle) per 100 acres. Number	Total live stock (units) on 100 acres. Value	Draught stock (units) on 100 acres. Number	Draught stock (units) on 100 acres. Value	Total dead stock on 100 acres. Value	Productive cattle on 100 acres. Number	Productive cattle on 100 acres. Value	Total draught stock corresponding to 1 unit of draught stock. Value
£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d	£ s d
All the 100	21.27	16 0 1	4.24	4 8 4	7 3 7	12.46	9 9 11	— 13 10
Yield up to 200 marks per ha. (£ 4 per acre)	17.42	12 1 10	3.31	3 2 0	5 10 9	—	—	—
Yield between 200 and 500 marks per ha. (£ 4 and £ 10 per acre).	20.99	15 4 7	4.23	4 7 8	7 1 3	—	—	—
Yield above 500 marks per ha. (£ 10 per acre).	27.38	22 3 3	5.46	6 4 11	8 16 2	—	—	—
Size I, up to 250 acres	29.80	22 3 7	5.78	5 7 6	12 9 3	—	—	—
Size II, 250 to 625 acres	23.77	18 1 1	4.40	4 17 4	7 15 3	—	—	—
Size III, 625 to 1000 acres	19.20	14 12 8	4.08	4 3 11	6 10 11	—	—	—
Size IV, 1000 to 1500 acres	17.52	22 19 2	3.78	3 15 4	6 1 4	—	—	—
Size V, above 1500 acres	16.16	10 9 11	3.76	3 3 3	3 8 4	—	—	—
Distance from railway up to 3 km. (1.8 miles)	—	—	4.28	4 15 8	—	—	—	—
Distance from railway 3-6 km. (1.8-3.6 miles)	—	—	4.38	4 9 2	—	—	—	—
Distance from railway over 6 km. (3.6 miles)	—	—	3.07	3 0 6	—	—	—	—

in the inventory, while the whole productive stock is 59.32 per

8) The value of total dead stock per acre of cultivated area is

9) The average value of the dead stock diminishes with the extent of the cultivated area.

10) The average amount of dead stock increases as the farming becomes more intensive.

11) The amount of dead stock corresponding to each unit of weight stock is £34 5s.

12) The average value of the whole of the dead stock is 44.88 per cent. of that of the whole of the live stock in the inventory.

Wages of Farm Labour in the United States.

OLMES, GEORGE, K.: *Nineteenth Investigation, in 1909, continuing a Series that began in 1866.* — U. S. Department of Agriculture, Bureau of Statistics - Bulletin 99. Washington, November 1912.

The present report contains the results of 19 different investigations of the conditions of agricultural wages in the United States and reaches to 1866, in which year, for the first time, the average rates of wages in the United States were scientifically determined. The writer gives a summary of the information he was able to obtain concerning the condition of agricultural wages previous to 1866. Most of this information was found in the works of the statistical bureaus of the various States, in crop reports, and in the old year books of some farms.

They rarely afford average rates of wages, but only the wages of certain kinds of agricultural labour. From the above summary it appears that agricultural wages in the second half of the eighteenth and in the half of the nineteenth century were relatively high in the United States, and further that economic disturbances, such as those caused by war, exert a great influence on the rates of wages.

After some explanations on the method followed in calculating the average rates of wages, the writer gives tables of the average wages from 1866 to 1909 and for the several States, for the geographical divisions of the United States, and lastly for the whole of the Federal territory.

The monthly wages for male labourers which are engaged by the year, without board, were lowest in the South Atlantic States and highest in the western States; the average figure for the United States was £3 3s. 9d. in 1866; it rose then to \$17.10 (£3 10s. 4d.) in 1875, to \$16.79 (£3 9s. 1d.) in 1878 and rose continually till 1909 when it reached \$25.46 (£5 4s. 9d.). When board was supplied the western States still returns the highest figures, namely \$31.30 (£6 8s. 9d.), followed by the northern central States with \$22.22 (£4 11s. 5d.), the Atlantic States with \$20.73 (£4 5s. 3d.), the southern central States \$14.25 (£2 18s. 8d.) and the south Atlantic States with the lowest of wages: \$13.10 (£2 13s. 11d.).

When the labourers were hired only for the season the average wage with board, for the United States were in 1866 \$12.69 (£2 12s. 3d.), in 1875 \$12.65 (£2 12s. 0½d.), in 1875 \$13.53 (£2 15s. 8d.), and in 1909 \$24.58 (£4 5s. 7d.). In this year the corresponding wage in the western States was \$35.32 (£7 5s. 4d.), in the northern central States \$25.42 (£5 4s. 7d.), in the northern Atlantic States \$24.56 (£5 1s. 0½d.), in the southern central States \$16.57 (£3 8s. 2d.), and in the southern Atlantic States \$15.13 (£3 2s. 3d.).

When for the calculation of the average monthly wages, the wages of the labourers engaged by the year together with those hired only for the season are used, the following are found: For 1891 in the whole of the United States \$13.48 (£2 15s. 6d.). During the industrial crisis of the nineties wages fell, but rose again to \$13.90 (£2 17s. 2d.) in 1899, \$15.51 (£3 3s. 10d.) in 1902, \$18.75 (£3 17s. 2d.) in 1906 and \$20.44 (£4 2s. 4d.) in 1909.

According to the reports of the Inland Revenue the total amount of agricultural labourers' wages rose from \$357 391 930 (£73 513 7) in 1899 to nearly twice as much, namely \$651 611 287 (£136 769 95) in 1909. If it be considered that the average rate of wages has risen only by about 30 per cent. and that the number of labourers has certainly not doubled within the 10 years, the great increase in the total cannot be explained by assuming that the time during which agricultural labourers are engaged in the course of the year has of late years considerably increased. The average amount of wages paid per farm was \$62 (12s. 3d.) in 1899 and \$102 (£21 8s. 2d.) in 1909.

The average daily wage for harvest work, board being given at the same time, amounted in 1866 to \$1.04 (4s. 5d.) and rose in 1875 to \$1.11 (4s. 10d.). It then fell and rose reaching \$1.20 (4s. 11d.) only in 1881, after which it sank to \$0.96 (3s. 11½d.) in 1895 and rose again to \$1.11 (5s. 1d.) in 1902 and \$1.43 (5s. 11d.) in 1909. The highest daily wages were \$2.02 (8s. 4d.) in the western States in 1909, the lowest \$0.83 (4s. 3d.) in the south Atlantic States. The average daily wages for other than harvest work in the United States were \$0.64 (2s. 8d.) in 1866, \$0.68 (2s. 10d.) in 1875, \$0.70 (2s. 11d.) in 1881; they remained stationary till 1898 and then rose in 1899 to \$0.75 (3s. 1d.), in 1902 to \$0.83 (3s. 5d.) and to \$1.03 (4s. 3d.) in 1909.

For the whole Federal States the average monthly wages rose from 1866 to 1909 by 78.9 per cent. for hands engaged by the year, and 63.9 per cent. for those hired only for the season. The daily wages for harvest work rose from 1866 to 1909 by 37.5 per cent. and for other work by 60.9 per cent.

The oscillations in the rates of wages are illustrated by a diagram which shows at a glance that the industrial crises of the seventies and the nineties depressed agricultural wages, which rose considerably from 1890 to 1908.

The writer remarks further that the wages in money do not represent the whole earnings of the agricultural labourers, who often get supplies

in the shape of supplies in kind or of the use of dwellings, stables, pastures, etc. These supplements are valued very differently according to circumstances, in the several States and even in various parts of the same State. The monthly value of a dwelling house and its contents is estimated at \$1.75 to \$5 (7s. 2½d. to £1 os. 7d.) when the labourer gets board also, and \$1 to 4.50 (4s. 1½d. to 18s. 6d.) when he does not.

The average value of the forage for a cow, a horse, a pig, or for poultry is set down at \$1.11 to 3.11 (4s. 7d. to 12s. 9½d.) per month. The average monthly value of pasturage for a cow, a horse or a pig amounts to \$5 to 1.61 (2s. 8d. to 6s. 8d.). Wood for fuel and the use of the team when it is considered equivalent to \$1.06 to 2.39 (4s. 4d. to 9s. 10d.) per month.

Between 1890 and 1907 the wages of agricultural labourers rose much higher than those of hands engaged in the industries. The average figures for the latter between 1899 and 1907 are 11.20 per cent. higher than those for 1890 and 1898, while among agricultural labourers the corresponding increase is 21 to 26.6 per cent.

The value of the labourer's board was estimated at \$5.41 (£1 2s. 3d.) in 1866, at \$6.20 (£1 5s. 6d.) in 1880, and at \$7.41 (£1 10s. 6d.) in 1909.

In the case of daily wages at harvest time the value of the labourer as considered to be \$0.30 (1s. 3d.) in 1866; during the industrial revolution of 1840 it fell to \$0.21 (10½d.) and rose to \$0.28 (1s. 2d.) in 1909. The rest of the year it is valued \$0.02 to 0.03 (1d. to 1½d.) less.

In 1866, the daily wages for harvest work were, on average, paid 1s. 10d. more than for other farm work; in 1880 this difference had risen to \$0.57 (2s. 4d.), in 1894 to \$0.34 (1s. 5d.) and in 1909 to \$0.42 (1s. 8d.).

When the labourer was hired only for the season the monthly wages in 1866 \$2.58 (10s. 7½d.) and in 1909 \$2.79 (11s. 6d.) higher than when he was hired for the whole year.

In the second and smaller part of the report, the writer gives a summary of the results of three enquiries (1902-1906-1909) on the conditions of life for female domestic labour in the country.

In 1909 26.4 per cent. of the female servants were hired for the whole year. The highest percentage is 40.6 in the north Atlantic States, then 30.8 in the south Atlantic States with 30.8, the northern central States with 22.7, the southern central States with 22.7 and lastly the western States with 22.3 per cent.

The average monthly wages of these servants amounted in 1902 to \$1.15 (£1 15s. 9d.), in 1906 to \$10.80 (£2 4s. 5d.) and to \$10.39 (£2 2s. 9d.) in 1909.

In 1909 they were highest in the western States \$18.74 (£3 17s.); followed by the north Atlantic groups of States with \$11.59 (£2 7s. 8d.), the northern central States with \$11.38 (£2 6s. 10d.), the southern middle States with \$8.22 (£1 13s. 10d.) and lastly the south Atlantic States with \$3.39 (£1 6s. 3½d.).

When the servants were hired only for the season the monthly wages were, on average, \$1 to \$1.50 (4s. 1½d. to 6s. 2d.) higher; in the western States in this case they reached in 1909 \$21.55 (24 8s. 8d.), in the Atlantic States \$8.25 (21 13s. 11d.).

As daily wages for female farm hands \$0.62, 0.76 and 0.77 (2s. 6d., 3s. 1½d. and 3s. 2d.) were paid in the above three years.

The returns showed that the neighbourhood of towns with upwards of 25 000 inhabitants did not have in every State the effect of increasing the rates of wages of female workers, and that this depends more on special conditions of each State.

In conclusion the writer notes that also in the United States work in the household is often considered as a derogatory occupation, and deplores the disappearance of the so-called home industries in the country.

173 - The First Year of Book-keeping at the Agricultural Institute Rotholz in Tyrol.

GROFF, L.: Das erste Buchführungsjahr an der landwirtschaftlichen Landesanstalt Rotholz in Tirol. — *Wiener Landwirtschaftliche Zeitung*, 63rd Year, No. 3, pp. 25-26 January 8, 1913.

The writer proposes to show by the present results of book-keeping how erroneous is the widely spread view that the farm of an educational institution cannot in itself be a profitable undertaking.

The farm of the Institute is of a compact form and includes 242 acres of arable land, 168 acres wooded area, and 617 acres of alpine pasture. Of the arable land 178 acres are rented out, only 64 being farmed by the Institute. Of these 44½ are under lea and forage crops, 12 acres devoted to other crops and 7½ to the nursery and vegetable garden.

The accounts are divided into three groups: 1) field crop accounts, 2) live stock and alpine pasture accounts, 3) technical or agricultural industrial branch.

The total expense for the meadows amounted in 1911 to \$179.21, the gross returns to £361 16s. 11d., which leaves a net profit of £130 3d., or 16.5 per cent. on the capital. The fairly high yield of 63.7 of hay per acre from the bad wet meadows of the Institute is due to a dry summer.

The favourable weather allowed the hay to be harvested with a small amount of labour, so that the cost of production, 1s. 6d. per cwt., is well below the calculated market price of 2s. 7½d. per cwt. For clover the cost of production, owing to the greater amount of work it requires, is much higher: 2s. 1d. per cwt.

The further calculation of the profits on the field crops is given in the following table.

The cultivation of green maize yielded only 5 per cent. interest, while with vetches the cost of production was much higher than the value of the vetch hay. The field crop accounts show on the whole a net profit of 14.2 per cent. on the capital.

Crops and Area in acres	Expense £ s d	Gross returns £ s d	Net profit		
			Total £ s d	Per acre £ s d	Per cent. on capital
... 4.32 acre	99 10 9	138 8 4 $\frac{1}{2}$	38 17 7 $\frac{3}{4}$	8 19 9	21.0
... 4.64 "	59 8 1 $\frac{1}{2}$	76 5 4	16 17 2 $\frac{1}{2}$	3 12 6	8.7
... 0.79 "	26 19 6 $\frac{1}{4}$	35 19 4 $\frac{1}{4}$	8 19 10	10 16 10	26.4

The alpine pasture yielded £84 16s. 10d. against an outlay of £66 16s. 4d., the net profit being thus £18 os. 6 $\frac{1}{4}$ d., or 0.91 per cent. of the capital.

In order to improve this result the writer demands that the sum for the grazing of stock belonging to outsiders be raised. At present only 1.3d. per head per day.

In the cattle shed there were in 1911, 45 cows, 1 bull, and 5 heifer and 1 calves. The net profits from the cattle amounted to £88 2s. 7 $\frac{1}{4}$ d., 4 per cent. on the capital. (Outlay £954 3s. 2 $\frac{1}{4}$ d., gross returns £58 9 $\frac{1}{2}$ d.). Pig rearing yielded as much as 9.05 per cent. on the capital. The total outlay for draught stock (2 horses, 2 oxen, 1 mule) sent, after deduction of the income derived from manure, increase of value and work done for hire, the value of the work done in the farm, account therefore shows no net profit.

The dairy gave a net profit of £105 4s. 10d. or 22 per cent. on the capital. The production of butter and skimmed milk cheese proved profitable than the direct sale of the milk. The percentage of net profit seems disproportionally high; the reason of this is to be sought in the low valuation of the capital. The total net return of the farm as given by the Institute is 7.24 per cent., and including the accessory enterprises (dairy, forest and nursery) 7.8 per cent. of the capital.

As to these very favourable results in 1911 several factors contributed: the price given to the land: £19 16s. 9d. per acre, is very low in comparison with present prices. The weather conditions of 1911 were unusually favourable for the property, which has an excessively moist subsoil; and the over possible expensive human labour was replaced by labour-saving machines. But even giving the land a higher value and allowing for less favourable weather, the interest on the capital engaged in the farm of the Institute will not sink below the normal rate of 4 per cent.

A Cantonal Agricultural Book-keeping Office.

Die kantonale landwirtschaftliche Buchführungsstelle. Mitteilung der landwirtschaftlichen Gesellschaft des Kantons St. Gallen. — *Schweizerische Landwirtschaftliche Zeitschrift*, Year XL, Part 50, pp. 1164-1165. Zürich, December 13, 1912.

The board of the agricultural society of the Canton of St. Gall resolved on December 2, to institute a cantonal book-keeping office in con-

nection with the agricultural School at Custerhof. The chief of this office is to awaken the interest of farmers in agricultural accountancy and to induce them to practise regular book-keeping. The means employed to attain this end are : courses of instruction and the publication of the results of farming.

AGRICULTURAL INDUSTRIES.

175 - Dairying in Hungary in 1911.

KOEFER, STEPHAN.: Ungarns Milchwirtschaft im Jahre 1911. — *Ausgaben des k. u. k. Ackerbauministers.* Budapest, 1912.

For the clear representation of the dairying conditions of Hungary an examination of the available data on the numbers of head of cattle and sheep existing in the country is necessary. The following tables I and II, supply the required figures :

TABLE I. — *Number of Cattle in Hungary.*

Breed of Cattle	In 1895 Head	In 1911 Head	Variation	
			Head	Per cent.
Hungarian	3 756 137	1 872 790	— 1 883 347	— 51.4
Parti-coloured	347 527	3 590 818	+ 2 243 291	+ 166
Gray	158 112	171 867	+ 13 755	+ 8
Other breeds.	434 664	392 757	— 41 907	— 9
Buffaloes	132 578	155 192	+ 22 614	+ 17
Total . . .	5 829 018	6 183 424	—	—

TABLE II. — *Number of Sheep in Hungary.*

Breed of sheep	In 1895 Head	In 1911 Head
Merino	7 526 686	2 353 105
Raczka and Czizgaja		4 037 345
English mutton sheep		1 306 432
Total . . .	7 526 686	7 696 882

In the census of 1911 the different breeds of cows were returned separately. Altogether there were 2 619 264 head, or 42.35 per cent. of the total number of cattle.

The writer lays down for the cows of each breed a certain average yearly production of milk, and with this basis and the number of cows calculates the total amounts of milk produced in the country. For Hungarian cows the average yearly yield is 198 gals. For parti-coloured cows 330 gals., gray cows 396 gals., other breeds 264 gals., and buffalo cows 176 gals.

According to the above the production of cow's milk was, in 1911, 18 million gallons, worth about £18 700 000 (calculating 5.9 d. per gallon).

In the year 1911, 3 310 000 (in round numbers) ewes were milked; amount to 43 per cent. of the total number of sheep. Taking the average at 8.8 gallons of milk per ewe, the total production of ewes' milk may be set down at about 29 million gallons, which, at 6.8d. per gallon, are worth about £820 000.

The value of the total milk production is thus about £19 520 000. The writer then calculates the cost of production of the milk and comes to the conclusion that the keeping of milch stock is not often profitable for the small farmer. He recommends the institution of milk record stations as a means of raising the production of milk, as the cost of production diminishes (within certain limits) with the greater amount of milk produced per cow. He reports next upon the Hungarian milk record associations and on milking competitions.

If from the total amount of cows' milk produced, namely 18 million gallons, the quantity consumed by the population be deducted, calculating 26.4 gals. per head (of the 18 300 000 inhabitants) per year, or 483 million gallons, and the 15 million gallons of fresh milk which are exported, there remain about 262 millions of gallons of cows' milk and 11 million gals. of ewes' milk for dairy purposes.

It is further stated that there are in Hungary about 600 dairy associations; a certain number of them are cooperative, but very small. There are besides two large joint stock companies which make and export butter.

The production of cheese in Hungary is considerable. The chief cheeses made are Hungarian Emmental, Trappist, Romadour and Gruyère cheeses, besides the Liptauer made from ewes' milk.

In a table at the end of his paper the writer gives precise data on the produce exports and imports for the years 1909, 1910 and 1911, showing to which the amount of butter exported in 1911 was 60 038 cwt. and that imported 14 292 cwt. As for cheeses only ewes' milk is shown as an excess of exportation (50 255 cwt.) over the importation (30 000 cwt.). The imports of dessert cheeses are very much above the exports, while of other cheeses the amounts are nearly even.

176 - The Use of the « Gär-Reductase » Test in Conjunction with Usual Milk Tests as a Basis for the Price of Milk in Co-operative Dairies.

KONRADT, EMIL.: Die Gärreduktaseprobe in Verbindung mit der gewöhnlichen Milchkontrolle als Grundlage für die Gütebezahlung der Milch in Genossenschaftsmolkereien. — *Molkerei-Zeitung*, Berlin, Nos. 52 and 53, pp. 601-602 and 613-614. Berlin, December 21 and 28, 1912.

The "Gär-reductase" test, according to Orla Jensen, serves to show defects in milk. The Gär tests alone were first used in Switzerland for testing and pricing the milk in cheese factories. The reductase test which was first employed by Barthel, depends upon the fact that living bacteria have the property of taking up certain colouring matters and excreting in their place colourless metabolism products, whereby the colouring matters introduced into the milk disappear. The rapidity of the process depends on the temperature and the number of bacteria present. If all the samples of milk receive the same amount of colouring matter and are kept at the same temperature, the rate of discoloration depends entirely on the number of the bacteria.

Jensen has combined the two methods. He took a sample of 40 cc. from each milk can; to this he added 1 cc. of a methyl-blue solution made by dissolving one methyl-blue tablet, prepared expressly for this purpose, in 200 cc. of water. The milk samples into which the colouring matter had been introduced were placed in a water-bath, which was kept at the constant temperature of 38° C. The milk should be carefully watched for the first 20 minutes; afterwards it need only be looked at every quarter of an hour.

The milk can be divided into four classes, according to its behaviour during the test.

I. Good milk: the colour is perceptible for 5½ hours or longer. In this case, there are usually half a million bacteria to the cubic centimetre of milk.

II. Average milk: the colour is visible for at least 2 hours. Before 5½ hours have elapsed, the discoloration takes place. Number of bacteria per cc. usually from ½ to 4 millions.

III. Bad milk: the colour is apparent for over 20 minutes; before two hours, the colour disappears. Number of bacteria per cc. generally from 4 to 20 millions.

IV. Very bad milk: The colour is perceptible at most for 20 minutes. Bacteria per cc. usually over 20 millions.

As the bacterial flora in the milk samples is apparently unaffected by the colouring-matter absorbed, the various samples are kept at 38°-40°C. until the next day (20-24 hours); at the end of this time the milk has usually curdled. The appearance of the curdled samples depends upon the bacteria which have gained the upper hand and which were present in the greatest number at the beginning of the experiment. The samples may be gelatinous, distended by gas, spongy or cheese-like.

this way demonstrate the presence of harmful bacteria in the results of the "Gär-reductase" test (taking also into consideration the fat content, etc.) is taken as a basis for the price of milk, the question arises whether the normal price should be paid for good milk, the corresponding reduction made in the case of milk of inferior quality, or whether there should be a fixed price for all milk, with an addition or charge at the end of the year for especially good milk. The writer considers the latter system the best. It offers more encouragement than a percentage reduction for the production of milk free from defects. The periodic control of the milk sent to the dairies is therefore to be recommended. The writer mentions some Danish dairies in which such control is effected (now partly with the assistance of the "Gär-reductase" test) twelve and twenty-six times respectively every year.

Prices of Meat in the Argentine, New York and some European Cities.

MICHELET, JOUAN A. Precios de las carnes en la Argentina, y en las principales ciudades europeas. — *Revista de la Asociación rural del Uruguay*, Year XL, Nos. 9 and 10, 649-656 and 763-766. Montevideo, September and October 1912.

Rapport de M. VINCEY à la Section de l'économie du bétail et de l'industrie laitière de la Société des Agriculteurs de France. — *Bulletin de la Société des Agriculteurs de France*, Year 15, pp. 13-16. Paris, Jan. 1, 1913 (2).

In the Argentine the price of meat, which was 2.1 *d* per lb. at the beginning of 1912 reached 3.4 *d* per lb. at the close of the same year. As a comparison the writer gives the prices of meat in other countries, mostly obtained from official publications. A typical case is provided by Great Britain which consumes the best quality Argentine cattle at a lower price than re-exportable offals fetch in the producing country.

In Argentine municipalities oblige butchers to sell meat by weight exhibit a list of prices; but as a matter of fact the meat is sold by weight and not by weight, and the consumer pays 30 to 40 per cent. more than the nominal price. The following is the municipal tariff at Buenos Aires (in pence per lb.):

Werkeln	7.7	Chop	2.9
Werk-stenk	3.8	Brisket	2.4
Werk	3.8	Shoulder	2.4
Bones	1.4		

Prices of meat in New York. — In 1912 the prices of meat were the highest known in the United States. In September beef was at 30.3 *d* per lb. and, and it was predicted that before the end of the year it would reach 1.7 *d*. Cattle are sold at 15 to 17 *d* per lb. of live weight. Reckoning at 50 per cent., the New York prices are lower than the Argentine prices. In Argentine the cold-storage firms pay 11 *d* to 12½ *d* per lb. live-

The curd should be equally dense, and not stringy, flocculent or interrupted by gas.
See REVELL, *Handbuch der Milchkunde*, p. 317. Hannover, 1910. (Ed.).
See also: VINCEY et ROLLIN, *Le prix de la viande à Paris*. Paris, Dunot-Pinat, 1912. (Ed.).

Price of meat in the United Kingdom.—In 1911 the Argentine shed 85.5 per cent. of the refrigerated meat imported. The amounts to London were too large, so that prices fell and sales were made at a per cent. loss. This state of affairs decided the Argentine cold-storage to establish, at the beginning of 1912, an agreement by which the exportation of chilled beef was limited to 37 000 quarters per week, distributed equally among the various exporting firms, instead of the 50 000 to 60 000 which were sent in the last few months of 1911. After the conclusion of this agreement, which the writer thinks essential to allow a margin of profit to the Argentine companies, the prices of refrigerated and frozen meat on the London market rose about the middle of 1912.

Live bullocks from U. S. A., per head (March 1912)	£ 18 to £ 25
" " " " " " " "	" " " " " " " "
" " " " " " " "	" " " " " " " "
Frozen beef from U. S. A. " " " "	5 ½d. to 6 ½d. per lb.
Argentine beef (May 1912):	
Hind quarter (chilled)	3s. 4d. to 4s. 4d. per stone
Hind quarter (frozen)	2s. 9s. to 3s. 6d. " "
Fore quarter (chilled)	2s. 4d. to 2s. 8d. " "
Fore quarter (frozen)	2s. 4d. " "
Frozen Argentine mutton (May 1912)	2s. 2d. to 2s. 7d. " "
<i>Preserved meat (March 1912):</i>	
Corned beef, 1st quality per case (*)	33s. to 33s. 6d.
" " " " " " " "	" " " " " " " "
" " " " " " " "	" " " " " " " "
Boiled beef, 1st quality	21s. 6d. to 22s.
" " " " " " " "	" " " " " " " "
" " " " " " " "	" " " " " " " "
Corned mutton	33s. to 34s.
Boiled mutton, 1st quality	28s. to 28s. 6d.
" " " " " " " "	" " " " " " " "
" " " " " " " "	" " " " " " " "

(*) Containing 12 tins of 6 lbs. each.

Price of meat in France (1).—The following tables show the prices at some of the important markets in France:

Prices of meat on the market of La Villette, Paris (2)

Average price in	Bullocks		Cows		Bulls		Calves		Sheep		Pence per lb.
	Quality		Quality		Quality		Quality		Quality		
	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	
	pence per lb.	pence per lb.	pence per lb.	pence per lb.	pence per lb.	pence per lb.	pence per lb.	pence per lb.	pence per lb.	pence per lb.	
June 1912	7.8	6.5	7.8	6.5	6.9	6.5	8.8	7.2	10.0	9.1	9
Year 1911	8.5	7.7	8.5	7.7	7.3	6.9	10.4	9.1	11.3	10.5	9
• 1910	7.6	7.3	7.6	6.9	6.3	6.1	8.6	7.7	9.5	8.7	7
• 1909	7.1	6.8	7.1	6.7	6.0	5.0	8.9	8.3	10.1	9.7	6
• 1908	7.0	6.4	6.8	6.1	5.7	5.4	8.8	8.2	10.0	9.4	7

(1) See No. 180 below.

(2) The wholesale prices of meat at the "Halles Centrales" and those of live meat at La Villette are published monthly in: *Ministère de l'Agriculture, Direction d'Agriculture, Bulletin mensuel de l'Office de Renseignements agricoles*, Paris.

Mean retail prices in Paris, 1912.

Bullocks and Cows	Sheep	Calves
Beak 1s. to 1s. 3d. per lb.	Breast 6d. to 7d. per lb.	Breast 10½d. to 1s. per lb.
9d. to 1s. 1½d. "	Shoulder 9d. to 10½d. "	Loin 11½d. to 1s. 0½d.
1s. 1½d. to 1s. 6d.	Leg 11½d. to 1s. 0½d.	
1s. 4d. "		
10½d. "		

Prices of live stock at Bayonne.

Butcher's bullocks	3½d. per lb. live-weight.
Draught oxen	\$24 to \$32 the pair.
Cows	\$18 to \$26 " "
Milk fed calves	5½d. per lb. live-weight.
Sheep	4½d. " " "
Pigs	6½d. " " "

During the last ten years, the French exports of horses, cattle and fresh meat have been steadily gaining on the corresponding imports. The only exceptions were the years 1907 and 1909, during which the imports of horses and fresh meat were again larger. On the other hand, for salt and smoked meat the imports have always exceeded the exports. Since the end of the last century the prices of meat in France have been going steadily up. At the end of spring in 1911 they were 25 per cent. above the means of the years 1901 to 1910. These very high prices of the first half of 1912 resulted in an annual diminution of the consumption of meat in Paris to one-twentieth of the total consumption in 1910. Retail butchers and pork-butchers generally sell at about 1½d. per lb. dearer than they buy, wholesale or semi-wholesale, at the principal shambles at the "Halles Centrales" and in the provision markets. The raising of price from the wholesale or semi-wholesale means about 1d. for general expenses and ¼d. or ½d. for profit. Thus in the price paid by the Parisian consumer, the wholesale price accounts for 85 per cent., the retailer's handling for 15 per cent., namely 12 per cent. general expenses and 3 per cent. profit. On the money returns of all sales, both of the meat and the by-products of the total of butchers and pork-butchers' beasts, the country provider gets approximately 76 per cent. For expenses and profit remaining 24 per cent. are thus distributed among the intermediaries: 10 per cent. to the railway companies, 1 per cent. to the auctioneers, 5 per cent. to the city of Paris, 3 per cent. to the wholesale butchers and pork-butchers, and 13 per cent. to the retailers; this is reckoning all sorts of expenses, and an average distance from Paris.

Price of meat in Sweden.

Bullocks and cows	3d. to 4½d. per lb.
Sheep for slaughter	4½d. to 5½d. " "
Pigs	3½d. " "

Price of meat in Belgium.

Year	1880	1890	1895	1900	1905	1910
Bullocks and cows pence per lb.	6.9	6.7	6.75	6.7	7.25	7.8
Pigs	7.8	6.25	4.4	4.8	6.1	7.1

Average prices in the first half of 1912.:

	Live cattle		Meat without
	pence per lb.		pence per lb.
Native bullocks	4.3 - 5.4		7.4 - 9.7
Bullocks from U. S. A.	3.9 - 4.8		6.5 - 8.2
Dutch bullocks	4.8 - 5.4		7.6 - 9.5
French bullocks	4.8 - 5.2		7.4 - 9.5
Calves	4.8 - 6.3		8.7 - 13.0
Pigs	4.8 - 6.1		7.4 - 9.5

The eating of horse-meat has developed greatly in Belgium; in slaughter-houses at Brussels and Cureghem-Anderlecht the number of horses slaughtered has increased from 1847 to 3809 in the last five years. In 1916 099 horses for slaughtering were imported into Belgium, valued by customs at £3 11s per head. At present the horses for slaughter (mostly from Great Britain) fetch £6 to £12 for a weight of 660 to 880 lbs., the consumer pays 3 ½d to 5d per lb. for horse-meat as steaks, 3d for scrap.

Price of meat in Spain—The exportation of live beasts from the Argentin to Malaga and Barcelona has given good results. At Barcelona the bulls sold at 6 ½d to 6 ¾d per lb. of meat (weight of the quarters) and the sheep at 6 ½d. Small beasts are preferred; bullocks should not exceed 550 lb. (weight of the quarters) or sheep 42 lbs. The bullocks consumed in Spain mostly of good quality, especially the rather small native ones weighing from 200 to 400 lbs. The larger imported bullocks, weighing 600 to 800 lbs., are fat and less choice. Slaughtering calves under 130 lbs. in weight is prohibited.

Sale prices of meat in Spain.

	Bullocks	Calves	Sheep	Grass Lambs	Milk Lambs	Sheep	Pigs
Pence per lb.	6.4-7.5	8.75	6.9-7.6	6.5	8.75(*)	6.5	5.6

(*) Milk lambs are generally sold by head.

Retail prices of meat.

	per lb.		per lb.
Bullocks:		Milk kids and lambs:	
1st quality under cut	1s. 6d.	1st quality	10 ½d
1st quality without bones	11 ½d.	2nd quality with bones	8 ½d.
" " with bones	7 ½d.	Sheep:	
2nd quality without bones	9 ½d.	1st quality	10 ½d.
" " with bones	7 ½d.		
Calves:		Pigs:	
1st quality without bones	1s. 6d.	Loins without bones	10 ½d. to 14 ½d.
2nd " without bones	11 ½d.	" with bones	8 ½d. to 9 ½d.
3rd " with bones	10 ½d.		

Prices of green hides.

	Pence per lb.
Bullock hide	6.3
Calfskin	7.4
Sheepskin	6.7
Lambskin	7.6

Price of Argentine meat in Austria.

	Pence per lb.
Price of frozen meat in the Argentine	2.3
Shipping from Buenos-Ayres to London	0.36
Shipping from London to Trieste	0.23
Austrian customs duty	1.4
Carriage from Trieste to Vienna	0.14
Expenses of unloading, etc.	0.05
Cost of 1 lb. of frozen meat delivered in Vienna	4.5

Argentine meat, at the depot, with 10 per cent. waste:	
Fore quarters, per cwt.	30s.
Hind quarters, „ „	35s.

Price of meat in Italy.

Retail prices.

	Fore quarter with bones — pence per lb.	Hind quarter with bones — pence per lb.	Meat without bones — pence per lb.
<i>Bullocks or Cows:</i>			
rome	7.8-8.2	8.7-9.8	11.3-15.6
milan	7.8	7.8	12.1-13.0
naples	7.8	10.0	13.0
brescia	6.5-7.2	9.8	11.7-16.0
trieste	8.2	10.0	12.1
<i>Calves:</i>			
rome	7.8-12.6	15.2-16.2	13.4-15.2
milan	10.8	10.8	17.3-21.7
naples	10.8	10.8	21.7
brescia	6.5-8.5	12.6-13.4	15.6

Cost of Argentine meat at Genoa.

	Pence per lb.	For shipments of over 1000 tons. — pence per lb.
Meat on board at Buenos Ayres	2.39	2.17
Shipping to Genoa	0.87	0.35
Insurance	0.02	0.02
Customs duty at Genoa	0.61	0.61
Expenses of unloading, etc.	0.35	0.70
Total	4.24	3.85

Cost of Argentine meat at Rome.

	Pence per lb.
Cost at Genoa	4.24
Railway carriage from Genoa to Rome	0.26
Municipal dues	0.82
Slaughterhouse dues	0.07
Carting in Rome	0.04
Depot : say 30 days in cold store	0.43
Distribution to butchers' shops, other expenses	0.23
Loss, deterioration and interest on capital	0.22
Total	6.30

*Price of Argentine Cattle in Switzerland.**Cost of importing a bullock to Berne or Lausanne.*

	£	s	d
Shipping from Buenos Ayres to Genoa	5	7	0
Feeding	2	0	0
Expenses of unloading		5	6
Carriage from Genoa to Lausanne or Berne	1	5	6
Customs duties	1	5	6
Various expenses		7	0
Total	£10	10	6

The above figures refer to beasts which gave 715 lbs. of meat on slaughtering; this was sold at nearly $8\frac{1}{2}d$ per lb. *i.e.* £25 2s; deducting the expenses there remains £14 11s 6d for the price of the beast at Buenos Ayres.

178 - Importation of Cattle and Meat from the Argentine to Italy.

1. ZABALA, ROMULO. Importación de ganado y carnes argentinas al Reino de Italia. — *Republica Argentina, Boletín del Ministerio de Relaciones Exteriores y Culto*, XXXVI, No. 1, pp. 127-139. Buenos Aires, 1912.

2. ACEVEDO, EDUARDO. Exportación de ganado á Italia. — *Revista de la Asociación Rural del Uruguay*, Year XL, No. 9, pp. 691-696. Montevideo, September 1912.

1. — Italy holds the first place among European countries as an importer of Argentine cattle, and is second only to Belgium as an importer of sheep. The sale of Argentine beasts and meat is spreading all over Italy but at present it is of most importance in Liguria, Piedmont and Lombardy. Tuscany is furnished from the port of Leghorn, to which the beasts are shipped from Genoa; the writer considers that this reshipping might be avoided, and that Leghorn is a sufficiently important centre of importation to have a direct service. The cost of reshipping from Genoa to Leghorn is 7s 6d per head for cows and bullocks and 14s for bulls, plus 5pence for the captain of the ship.

Italian customs duties on live cattle.

Bullocks	30 s
Bulls	14 s 3 d
Cows	
Calves	6 s 3 d

Current prices for live Argentine cattle delivered in Leghorn.

	per cwt.
Steer calves	36 s
Bullocks of 30 months, of at least 6 cwt.	40 s
" from 5 months to one year.	40 to 44 s
Cows and heifer calves	32 to 36 s

2. — In 1911 the importation from the Argentine to the port of Genoa 33 846 steers, 12 428 wethers and 4 750 tons of frozen meat. The mortality on board in the early part of the year was 6 to 10 per cent., but later fell to 2 per cent owing to improvement in the conditions. The tariff varied between £4 and £5 12 s per head, and rose temporarily even higher than the latter figure. Insurance *f. a. p.* (against extraordinary losses) costs 1 cent; *c. a. p.* insurance (for ordinary mortality) is not undertaken by Italian companies, but English ones undertake it at various prices as high as 6 per cent., with 2 per cent. returned if no claims are made). Insurance is reckoned on a basis of £13 17 s 6 d to £15 17 s 6 d per head. The average price for live beasts at Genoa is 34 s per cwt.; or after the transit duty is paid 38 s. In the meat-marts at Genoa the price of beef is about £4 per cwt. for Italian and French, and about £3 8 s for Argentine.

- The Dead Meat Trade.

LOUGHRAN, O. W. H. in *The Department of Agriculture and Technical Instruction for Ireland: Journal*, Vol. XIII, No. 1, pp. 27-36. Dublin, October 1912.

The value of the meat consumed in England between the years 1862 and 1862 was 2s. 6d. per inhabitant per year, while in the period 1905-1912 it rose to 21s. 7d. The value of the meat imported during these periods rose from £3 584 000 to £48 042 000. While in 1897 the amount of living cattle imported, namely 4 000 000 cwts. exceeded by much the quantity of beef imported (3 500 000 cwts.), in 1911 the former sank to 1 000 000 cwts. and the latter rose to 8 000 000 cwts. A similar change took place with mutton.

These variations are due principally to two causes. The exportation of living animals is always liable to interruption by the outbreak of some disease leading to the prohibition of imports by other countries. Consequently, when the introduction of dead meat has once begun no one is likely to go back to the exportation of living animals. The second reason is that the cost of transport of dead meat, both by rail and by ship, is considerably inferior to that of living animals. Besides which there is the advantage that with the dead meat trade other industries can be carried on, such as converting some of the offal into useful food stuffs, leather tanning, the manufacture of soap, margarine, glue, horn combs, brushes, etc. All these reasons contribute to give the dead meat trade a solid and firm basis in the Smithfield market.

The buildings of this, the greatest meat market in the world, cover an area of about 10 acres, and include 344 butchers' shops with a staff of

about 5000 persons. The amount of meat it dealt with in 1907 479 037 tons and in 1911, 435 316 tons. Of this mass of meat 77.2 per cent. came from the colonies and from abroad, of which 80 per cent. was in cold storage. Argentina provides the greatest quantity of mutton, whilst New Zealand is the greatest purveyor of mutton, though Australia sends nearly as much. The United States and Denmark hold first place as providers of bacon and hams, while Holland supplies the greatest quantity (80 per cent.) of fresh pork. In the United Kingdom itself for a long time past Scotland has forwarded the best quality of beef and mutton. In particular, Aberdeen sends to Smithfield, in specially built railway cars, great quantities of meat, which command highest prices.

In Holland the slaughter houses which kill pigs for exportation situated as near as possible to the ports. The dead pigs are hung in iron hooks in heavy cases and so carried by rail or ship. To every slaughter house veterinary surgeons are appointed by the Government to examine the meat as to its fitness. The offal is also sent to London. The writer has visited several large slaughterhouses in Holland which deal with 2000 to 3000 pigs per day. He believes that Ireland also could successfully export fresh pork and mutton to England if the same measures as are current in Holland were adopted.

Though the trade in live stock between Ireland and England presents some advantages, such as the short distance for sea transit from port to port, and the formed connection between shipper and consumer, the other hand greater advantages are offered by the dead meat in namely:

1. — Its special value at periods of disease outbreak, when live stock trade is temporarily stopped.
2. — The avoidance of the loss of weight and deterioration in quality inevitable to the live system.
3. — The higher price commanded by really prime finished meat at Smithfield as proved by practical tests.
4. — The educational effect of a dead meat business on the Irish feeder, by showing him the profit to be realised by rearing and finishing cattle of the best quality and finishing them well.
5. — The probability that a trade that has been found profitable by Scotch feeders, who finish largely Irish stores, would be still more so to Irish farmers who produce the stores themselves.
6. — The establishment of subsidiary industries that would be rendered possible by the dead meat trade and would offer a considerable amount of employment.

The hides of cattle slaughtered in Ireland are either worked up in the Irish tanneries or exported chiefly to Liverpool, Manchester or Glasgow by English firms and brokers. A large proportion of the Irish hides are ultimately sent to America.

The fat is utilized to a certain extent in Ireland, but only for the manufacture of soap, while in Hamburg for instance the fat is refined and graded

these qualities for the production of margarine, lard and machine and thus more profitably disposed of. The blood also in Hamburg is used for the preparation of sausages, molasses feeds, and manure, in Ireland (with the exception of Dublin) it is thrown onto the manure heap.

In Ireland the heads, tails, tongues, hearts and livers are sold for and broth making, while in marketing centres they command much higher prices.

The average price paid for the offal of prime beef in the London market is 50s. In the year 1908 Ireland shipped to English and Scotch ports 134 head of cattle and 183 485 head were killed for home consumption. At the value of the offal at £2 10s. per head, the value of the raw material supplied to the United Kingdom equals over £200 000. In the year 1907 725 537 sheep were exported, and the offal value of these taken together would represent an additional £200 000. There can be little doubt that, if these offals could be retained and worked up in Ireland, could considerably enhance the present value of the cattle rearing industry to the country.

The Sale of Cattle for the Butcher and the La Villette Market.

ALLIANCE. La vente du bétail de boucherie et le marché de la Villette. — *Bulletin des Travaux de la Société nationale d'Agriculture de France*, Vol. 72, No. 8, pp. 756-763, Paris, 1912.

The market of La Villette serves as a centre for the sale of cattle to the butcher and of meat for the supply of Paris, as it is situated at the junction of the railway-lines connecting the cattle-raising districts of Central and Western France with North and East France, where this industry is little practised. It is thus the meeting-ground for buyers and sellers from a large tract of country. On account of the size of the market, the supply and demand are always equal. The market is open to all who wish to buy or sell cattle. Thus the small proprietors can arrange among themselves and send one of their number to La Villette to sell their cattle, if they do not care to entrust the matter to a middle-

The writer gives details of the arrangements and selling-methods in the market and mentions the changes in prices. From 1899 to 1910, the price of meat rose, on account of the increased demand for this article and the general increase in the production cost and the demand from abroad. In 1911, the price again rose, but without in any way benefiting the producer, for the return from cattle was very little owing to the prevalence of drought and a renewed outbreak of foot-and-mouth disease. The La Villette market thus affords a gauge of the condition of cattle breeding. It has been alleged, that the market by its cattle trade promoted the spread of the foot-and-mouth disease. The sending of cattle there was for a time forbidden, but this prohibition was soon cancelled, owing to the bad effect on the cattle trade and its inefficiency from a prophylactic point.

It was then proposed to build slaughterhouses in the centres of production and to have cattle markets attached where the animals were to be sold. These markets, however, proved disastrous for the small producers who were obliged to sell their animals for any price which was offered. Soon, however, the slaughterhouses became the property of large Joint Stock Companies, which by the formation of trusts, were enabled to force whatever prices they chose on the producer and the consumer. Thus the price of meat did not go down. The middlemen of the La Villette market were only replaced by the agents of the Slaughterhouse Societies. Also the transport costs were not diminished, for the slaughterhouses were obliged to get their cattle from a distance of 30 to 60 miles or more, and further, the danger of spreading foot-and-mouth disease remained the same.

It was therefore best to improve the existing markets in the towns and especially that of La Villette. In order to accomplish the latter purpose, it is necessary to rebuild and enlarge the railway-station and provide the slaughterhouses and market with their own sidings for loading cattle. The slaughterhouses must be better equipped with disinfecting appliances and have more cold-storage chambers.

If the conditions and means of transport were improved, and the police-regulations regarding foot-and-mouth disease extended, this important question, which is so much occupying the minds of agricultural organisers, would soon be solved.

181 - The Making and Composition of Tunisian Wines.

MARCELLE, R.: *La Vinification et la Composition des Vins de Tunisie*. — *Bulletin mensuel de la Direction Générale de l'Agriculture*, Year 16, No. 63, pp. 128-149. Second Quarter, 1912.

In the first part of his paper, the writer gives an account of the different processes of wine-making: he treats of the use of sulphurous products which are utilized, the determination of sulphurous products, the changes which it undergoes, and its relation to alcoholic fermentation, and finally he suggests clarifying the must by centrifugal force. Marcelle has himself made some preliminary experiments in this direction, using small dairy separators. These experiments, although interesting, seem of interest, for they allow of its being concluded that industrial machines would furnish musts containing in suspension pectic matters together with fine cellulose particles from the pulp.

In spite of the violent agitation which the liquids undergo on the apparatus, the loss of the free sulphurous acid of the musts is relatively very small. On the other hand, the musts to be submitted to centrifugal action should only receive small quantities of sulphurous products, since the economy of the process consists precisely in permitting the liquids to ferment immediately after purification through passing through the turbine.

The second part of the article in question treats of the composition of Tunisian wines, and shows that certain characteristics which

cause these natural products to fall under the suspicion of having falsified. Numerous tables of analyses and statistics of results in the Laboratory of Agricultural Chemistry in Tunis give the which the writer has based his opinion; the latter is of the more as he gives information and arguments, of which we reproduce the most important.

The Tunisian vineyard differs not only from the French, but also from those of the Departments of Algiers and Constantine. In these countries, the vine is usually planted on rich plains, where the rain-falls exceed 600 mm. (24 in.) and the vintage is often more than 880 per acre. In Tunis, nine-tenths of the plantations are situated in districts with a rainfall of less than 450 mm. (18 in.), and the average yield of the vines in bearing is only 260 gallons. From these differences arise variations in the composition of the wines, all the more so as the local climatic conditions produce differences in the physiological processes of ripening. The functions of the grapes are often hindered by the scorching of the organs which supply them with acids. Consequently to the effect of the long dry summers, and especially when heat occurs before the period of maturity, a must is produced which is rich in sugar, and the wine has a low alcohol content and at the same time is very deficient in acid.

These accidents are of annual occurrence in most of the vineyards. It is true that certain stocks like Aramon, Monrastel, and Carignan are especially affected, yet cases of the same kind occur in the crop of other districts. This for example was observed in the vintage of 1911. These other important differences may be mentioned, showing that the results of Blarez and Halphen cannot well be applied to Tunisian wines. The ripening of grapes, of which the synthetic activity appears to be influenced under the influence of intense insolation, differs in its progress from what has been observed in France. From the time of the grapes changing colour, the acid cannot accumulate in the fruit and when the ripening occurs steadily the alcohol content of the wines increases with acidity. The composition even of the musts must also differ, for the addition of several grams of acid sometimes makes very little difference in the wine. In an experiment made at the Colonial School of Agriculture in Tunis the addition of 2.75 gr. of citric acid had increased the final amount of fixed acid in the wine from 0.3 to 0.4, and 3 gr. of tartaric acid to 0.7. This shows how arbitrary it would be to try and judge of acidity by subtracting the added acid from the acidity of the wines. On the other hand, the statistics of the analytical results show that of 100 samples examined during the last five years, 27 per cent. of the red wines and 40 per cent. of the white deviated by more than 10 from Halphen's rule and by 15.9 and 28.5 from that of Blarez. These results came exclusively from well-known proprietors. The wines from young vines give very low figures as regards alcohol content, acidity and the amount of dry substances present; on the other

hand, some grapes like Alicante, Ugni, and Chasselas are rich in it but often poor in extracted matter.

The presence of free tartaric acid has been detected in white and wines to which citric acid has not been added ; the red vintages of 1910 and 1911, however, show no trace of it.

The great majority of Tunisian wines, from different sources as to vine and origin, give a dextro-rotary deviation ; the reverse is the case with French wines.

Normal boric acid occurs in Tunisian wine in the proportions of 10 to 35 mgr. per litre ; and manganese was present in one sample in exceptional amount of 20 mgr. ; this same sample contained 256 mgr. of iron. According to the writer, this might give a means of distinguishing normal from added manganese.

PLANT DISEASES

GENERAL INFORMATION.

The National Quarantine Law of the United States of America I Regulations.

National Quarantine Law. An Act to regulate the importation of nursery stock, other plants and plant products; to enable the Secretary of Agriculture to establish quarantine districts for plant diseases and insect pests; to permit and regulate the movement of fruits, plants, and vegetables therefrom, and for other purposes. In *Monthly Bulletin of State Commission of Horticulture*, Vol. I, No. 19, pp. 791-795. Menlo, California, September 1912.

S. Department of Agriculture, Office of the Secretary, Federal Horticultural Board, Law No. 41 (Revised). Washington, December 20, 1912.

S. Department of Agriculture, Office of the Secretary, Federal Horticultural Board, No. 1, Washington, September 19, 1912.

Notice of Quarantine No. 2 (Domestic), September 28, 1912.

Notice of Quarantine No. 3 (Foreign), September 28, 1912.

Notice of Quarantine No. 4 (Domestic), November 13, 1912.

1. — It shall be unlawful for any person to import or offer into the United States any nursery stock unless and until a permit shall have been issued therefor by the Secretary of Agriculture, upon such conditions and regulations as the said Secretary of Agriculture may prescribe; and unless such nursery stock shall be accompanied by a certificate of inspection, in manner and form as required by the Secretary of Agriculture, of the proper official of the country from which the stock is imported, to the effect that the stock has been thoroughly inspected and is believed to be free from injurious plant diseases and insect pests; the Secretary of Agriculture shall issue the permit for any importation of nursery stock when the conditions and regulations prescribed in this act shall have been complied with; nursery stock may be imported for experimental or scientific purposes by the Secretary of Agriculture upon such conditions and under such regulations as the Secretary of Agriculture may prescribe; and further, that nursery stock imported from countries where no official system of inspection is maintained may be admitted upon such conditions and under such regulations as the Secretary of Agriculture may prescribe.

2. — It shall be the duty of the Secretary of the Treasury to notify the Secretary of Agriculture of the arrival of any

nursery stock at port of entry; the person receiving such stock at port of entry shall, immediately upon entry and before such stock is taken for shipment or removed from the port of entry, advise the Secretary of Agriculture or, at his direction, the proper State, territorial, or district official of the State or territory or the district to which such stock is destined, or both, as the Secretary of Agriculture may elect, of the name and address of the consignee, the nature and quantity of the stock proposed to ship, and the country and locality where the same was grown. The same formalities are required for the transport from one State or territory or district of the United States of any imported nursery stock, unless such imported stock has been inspected by the proper official of the State or territory or district of the United States to which it is to be transported.

Secs. 3 and 4. — The packages containing nursery stock shall be properly and correctly marked to show the general nature and quantity of the contents, the country and locality where the same was grown, the name and address of the person shipping or forwarding the same, and the name and address of the consignee.

The same formalities are necessary for the transport from one State or territory or district of the United States into any other State or territory or district of any such imported nursery stock, unless it has been inspected by the proper official.

Sec. 5. — Whenever the Secretary of Agriculture shall determine that the unrestricted importation of any plants, fruits, vegetable bulbs, seeds, or other plant products not included by the term "nursery stock" as defined in section six of this Act may result in the introduction of any such plant, fruit, or vegetable into the United States or any of its territories or districts of which it is known that it is afflicted with any such plant diseases or insect pests, he shall promulgate his determination specifying the class of plants and plant products the importation of which shall be restricted and the country and locality where they are grown, and thereafter, and until such promulgation is withdrawn, such plants and plant products shall be subject to all the provisions of the first section of this Act; provided, that before the Secretary of Agriculture shall issue such promulgation, he shall, after due notice, give a hearing, at which any interested party may appear and be heard in person or by attorney.

Sec. 6. — The term "nursery stock" shall include all field florists' stock, trees, shrubs, vines, cuttings, grafts, scions, bud pits and other seeds of fruit and ornamental trees or shrubs, and plants and plant products for propagation, except field, vegetable, and flower seeds, bedding plants, and other herbaceous plants, bulbs, and cuttings.

Sec. 7. — Whenever, in order to prevent the introduction of any such plant, fruit, or vegetable into the United States of any tree, plant, or fruit disease or of any insect, new to or not theretofore widely prevalent or distributed and throughout the United States, the Secretary of Agriculture shall determine that it is necessary to forbid the importation into the United States of any class of nursery stock or of any other class of plants or plant products, and notwithstanding that such class of plants or plant products be accompanied by a certificate of inspection from the

portation, before the Secretary of Agriculture shall issue such regulation, he shall, after due notice to interested parties, give a hearing, at which any interested party may appear and be heard, either in person or by attorney; provided further, that the provisions of this section, as applying to the white-pine blister beetle (*Pissodes strobi*), potato wart (*Chrysophlyctis endobiotica* = *Synchytrium endobioticum*), and the Mediterranean fruit fly (*Ceratitis capitata*), shall become and be effective upon the passage of this Act.

§ 8. — The Secretary of Agriculture is authorized to quarantine any State, territory, or district of the United States, when he shall determine that a dangerous plant disease or insect infestation, new to or heretofore widely prevalent or distributed within and throughout the United States, exists in such State, territory or district; notice of quarantine shall be given to interested parties and to the press. No plants shall be exported from any quarantined State or territory or district shall not export plants of plants unless they shall have conformed to the provisions taken in connection by the Secretary of Agriculture and which refer to the disinfection, certification, and method and manner of de-shipment of the class of goods; provided, that before the Secretary of Agriculture shall promulgate that it is necessary to quarantine any State, territory, or district, he shall, after due notice, give a public hearing at which any interested party may appear and be heard, either in person or by attorney.

§ 9. — The Secretary of Agriculture shall make and promulgate rules and regulations as may be necessary for carrying out the purposes of this Act.

Sections 10 and 11 establish the penalties incurred by offenders under this Act. They consist of fines not exceeding \$500 (about £100) or terms of imprisonment not exceeding one year.

§ 12 appoints a Federal Horticultural Board for the purpose of carrying out the provisions of this Act.

§ 13 appropriates the sum of \$25 000 (about £5000) for the expenses and objects of this Act.

§ 14. — This Act shall become and be effective from and after the first day of October, nineteen hundred and twelve.

— The following Regulations concerning the importation of nursery stock were made by the Secretary of Agriculture of the United States on September 18th, 1912.

Definition. — See Section 6 of the said law. Furthermore, "All plants and parts thereof for propagation or planting are included under the term 'nursery stock.'"

Permits for Importation. — Persons wishing to import nursery stock must apply to the Secretary of Agriculture for a permit, stating the genus and quantity of the nursery stock, the State, district or locality where grown, the name and address of the exporter, together with the name and address of the importer in the United States and the point of entry. Applications for permits should be made in advance

of the shipment of the nursery stock, but if, through no fault of the importer, stock shall arrive before the issue of a permit, the stock shall be held in customs custody at the risk and expense of the importer for a period not exceeding ten days, pending the issue of a permit.

On approval by the Secretary of Agriculture of an application for the importation of nursery stock from countries which maintain a stock inspection, a permit will be issued. Permits will expire on the day of June of the year following the date of issue.

Entry of Nursery Stock. — Entry of nursery stock will not be allowed unless accompanied by a certificate issued by a duly authorised official of the country from which it is shipped, stating that it has been thoroughly inspected by him, and was found to be free from injurious diseases and insect pests. In the case of stock to be shipped before October 1st and May 31st this inspection must be made on or before October 1st, and for stock shipped during the growing season inspection must be made not more than 30 days prior to date of shipment. Until July 31st, 1913, however, the usual inspection certificate on the previous growing season will be accepted. When the country from which any nursery stock is shipped maintains no official inspection articles for which a permit has been issued will be admitted through the ports of New York, San Francisco, Seattle, Jackson and New Orleans, after examination by inspectors of the Department of Agriculture at the port of arrival, if found to be free from diseases and insect pests.

Nursery stock, if found infected, may be treated or destroyed under circumstances require.

Foreign Certificate of Inspection. — Certificates of inspection will be accepted if countersigned by duly authorised officials of foreign countries or their agents. On and after July 1st, 1912, certificates must contain the date of inspection, name of the grower, the district or locality in the country where grown, a statement that the stock has been inspected by a duly authorised official, and been found, or believed to be, free from dangerous insects and plant diseases, and must bear the name of the responsible inspection official for the country of origin.

Declaration. — On and after December 1st, 1912, all shipments of nursery stock to the United States from countries which maintain an official system of nursery stock inspection must be accompanied by a declaration of the shipper, produced before an American consular official. The declaration must contain a statement by the shipper that he believes the nursery stock to contain no injurious plant diseases or insect pests, the district or locality and country where grown, the name of the grower, the port of origin, and destination of the consignment, the date of inspection of the stock, and the name of the inspector, and the number of the permit issued by the Secretary of Agriculture.

On and after December 1st, 1912, consular invoices covering shipments of nursery stock to the United States must bear the number

issued by the Secretary of Agriculture, and have attached to the shipper's declaration.

— Notice No. 1 prohibits the importation into the United States from Great Britain, France, Belgium, Holland, Denmark, Norway, Sweden, Germany, Austria, Switzerland and Italy, until further notice, of the following species and their horticultural varieties, *viz.*, spruce (Pinus strobus L.), western white pine (Pinus monticola Dougl.), larch (Pinus lambertiana Dougl.), and stone or cembrian pine (Pinus laricina). The object of this prohibition is to prevent the introduction into the United States of the tree disease known as "white pine blister" (*Peridermium Strobi* Kleb.).

— Notice No. 2 prohibits the movement from the Territory of Alaska into any other State of the United States of America of Alligator apples, carambolas, Chinese inkberry, Chinese orange, Chinese plums, cherries, Danish plums, Eugénias, Figs, Grapes, Grapefruit, Green guavas, Kamani seeds, Kumquats, Limes, Loquats, Mangos, orange, Mountain apple, Natal or Kaffir plum, Oranges, Papaya, Persimons, Prickley pears, Rose apple, Star apple, String beans and Tomatoes. The object of this prohibition is to prevent the introduction into other States of the Mediterranean Fruit Fly (*Ceratitis capitata*), which is new to and not widely prevalent in the United States.

— Notice No. 3 prohibits the importation into the United States, without notice, of the common or Irish potato (*Solanum tuberosum*) from Newfoundland, the islands of St. Pierre and Miquelon, Great Britain and Ireland, Germany and Austria-Hungary, where the disease known as potato wart, potato canker, black scab, etc. (*Chrysophyctis endobioticum*, = *Synchytrium endobioticum* (Schilb.) Perc.) is declared to be present.

— Notice No. 4 quarantines the States of Maine, New Hampshire, Massachusetts and Rhode Island for Gipsy Moth (*Porthetria dispar*) and the States of Maine, Vermont, New Hampshire, Massachusetts, Connecticut and Rhode Island for Brown-Tail Moth (*Euproctis chrysorrhoea*).

Interstate movement of 1) coniferous trees, such as spruce, fir, cedar, pine, juniper (cedar) and arbor-vitæ (white cedar) and parts and decorative plants, such as holly and laurel, and 2) forest products, including logs, tan bark, posts, poles, railroad ties, corded lumber, and field-grown florist's stock, trees, shrubs, vines, and other plants and plant products for planting and propagation, such as buds, fruit pits, seeds of fruit and ornamental trees and shrubs, vegetable and flower seeds, bedding plants and other herbaceous plants and roots, from the quarantined areas is prohibited until plants and products have been inspected by the U. S. Department of Agriculture and pronounced free from the said insect pests.

183 - The Congress of the "Defensa Agrícola" at Montevideo (Uruguay) in April 1913.

Communication from the Director of the "Defensa Agrícola" of Montevideo to the National Institute of Agriculture.

Owing to the initiative of the "Ministerio de Industrias" the Congress of the "Defensa Agrícola" will be held at Montevideo in 1913. Argentina, Paraguay, Brazil and Chile have been invited to send delegates.

The following are the subjects proposed for discussion:

a) The control of locusts.

1. Given the present knowledge respecting the permanent and permanent zones where locusts occur, is collective international action possible in these districts?

2. The contribution of each State for the purpose of ascertaining whether there exist in their respective territories centres of distribution of locusts.

3. The form which co-operative international action against centres could take, should such action appear desirable.

4. The proportion and the manner in which each State could participate in such action.

5. Is it best to adopt an official scheme of a permanent chamber or to treat each case as it occurs and in the manner which seems suitable?

6. Measures for ascertaining the existence of other species of locusts, besides *Schistocerca paranensis*, against which it is necessary to generalize the international measures of control. The information already in the possession of the Congress and any further data are communicated respecting the existence of any at present undetermined species in the districts of South, North and West Brazil, in the State of Rio Janeiro, Paraná, Matto-Grosso, Parayba and Rio Grande do Sul. The manner of completing the investigations on this point.

7. The methods of controlling locusts practised in different countries and especially in those represented at the Congress. Methods of destruction: mechanical, physical (fire) and toxic. Biological and chemical. The utility of communicating generally the methods and systems of destruction in the case of auxiliary, or collective intervention, or of co-operative work for the destruction of the pests, especially in neighbouring countries.

b) Auxiliary telegraphic assistance.

8. The institution of an international telegraphic service, using a common code, for daily information respecting the condition and movements of the locusts.

9. The advisability of extending this service, and using it also for other purposes, such as for giving information concerning other agricultural pests.

10. Places which might serve as centres of information and

be entrusted with the regular transmission of news could be established.

1. The installation of a central service deputed to receive all data to compile a demonstration table showing the various phases of the invasion, with indications as to the frequency of the flight of the insects, numbers, the distance they fly, their retrogression, etc.

2. Could meteorological observations for each country be included in the service?

c) *The control of other agricultural pests.*

3. The advisability of devising a scheme of control for all the other insects which attack the crops. The measures adopted in each country and the results obtained.

4. The adoption of a uniform system in the service of the inspection of exported vegetable products, with the view of making more stringent conditions of obtaining certificates of origin.

5. The advisability of maintaining constant intercourse between governments of the adhering countries and the methods of attaining the same.

6. The adoption of preventive measures against the invasion of new pests.

7. The organization of a service of information which will assist in preventing the introduction of new diseases by means of isolating infected and suspected areas.

8. The measures of assuring, to the persons charged with the exportation, the efficiency necessary for exporting goods in a satisfactory condition.

d) *Protocol of the Convention.*

9. The advisability of leaving the protocol of the convention open, so that other South American countries may join.

10. The manner and date at which the approved measures will come into force, their duration and the method of proroguing them.

The delegates of each country can lay other schemes before the Convention.

DISEASES NOT DUE TO PARASITES AND OF UNKNOWN ORIGIN.

The Effects of Road-Tarring on Trees at Leghorn (1).

ASATI, E.: Sull'effetto dell'incatramatura delle vie a Livorno. — *Rivista di Patologia Sperimentale*, Year 5, Nos. 21-22, pp. 321-323. Pavia, 1912.

When the new railway-station was built at Leghorn a central road was laid leading to the town, parallel with which were side roads shaded by elms, holm-oaks and planes.

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A portion of the lateral roads was tarred, as was also a part of the main road, where the traffic was continuous. At first, nothing abnormal was noticed, but at the beginning of 1912, the old elms did not bud as usual and the leaves of the holm-oaks and other trees were partially withered. As the season advanced, the withering increased, till in July and August the elms had turned quite brown, and the holm-oaks were so in part that their leaves looking as though they had been burnt, while the plants which were already injured by *Lithocolletis*, showed also signs of being attacked by this new disease.

The macroscopic and microscopic observations made by the writer on material sent to him, or later collected by himself, agreed with the preceding investigations.

BACTERIAL AND FUNGOID DISEASES.

185 - The Structure and Development of "Crown Gall": A Preliminary Report (1).

SMITH, ERWIN, F.; BROWN, NELLIE, A., and McCULLOCH, LUCIA: U. S. Dept. of Agriculture, Bureau of Plant Industry, Bulletin No. 255, 60 pp., 2 figs., CIX, Washington, 1912.

The parasite of crown gall (*Bacterium tumefaciens*) has been isolated by the writers from 24 species belonging to 14 families of phanerogams. 8 species have resisted infection. The parasite has been grown in pure culture on a variety of media and its morphology and cultural peculiarities determined. It has also been stained within the tissues of the tumor and its form and locus therein determined. The morphology and biological peculiarities of the tumor growth have been studied. The tissues of the gall multiply excessively and in opposition to the best interests of the plant. The galled tissue, which is often of a soft, fleshy nature, is much subject to decay. It is not usually corked over, and this absence of a protective surface allows the ready entrance of water and of other parasites. The tumor originates in meristem, usually in the cambium region. It usually perishes within a few months or continues to grow (parts of it) for years. The tumor consists, or may consist, not only of parenchyma but also of vessels and fibers, i. e., it is provided with a stroma which develops usually as the tumor grows. A proliferating tumor usually contains not only meristem but pitted vessels and sieve tubes; it may also contain wood fibers, but does not always. The tumor sends out roots (rhizoids or strands) into the normal tissues. These may extend for some distance from the tumor — how far is not known. These strands consist of a meristem capable of originating medullary rays, tracheids, and sieve tubes. In the daisy-like strand passes through the protoxylem region of the stem

(1) See No. 2967, B. Aug.-Sept.-Oct. 1911.

rich in chloroplasts. It usually takes a deeper stain than the surrounding tissues, from which it is sharply delimited. A considerable part of it consists of unripe, actively vegetating cells. In the substance of the deep-lying strands secondary tumors develop. These gradually make their way to the surface.

The secondary tumors tend to take on the structure of the primary tumor, e. g., if the latter is in the stem and the former in a leaf, the secondary tumor shows a stem structure.

The stimulus to tumor development comes from the presence of the bacterium within certain of the cells. Apparently it is not in all. The organism has not been observed with certainty outside of the cells, either in the vessels or the intercellular spaces, nor is it abundant in the cells. Frequent copious inoculations have to be made to ensure cultures.

Under the microscope it can not be made out in unstained sections with any certainty, and most bacterial stains also fail to differentiate it from the tissues. It is best observed in tissues impregnated with chloride of gold.

By repeated inoculations through a series of years plants were obtained which appeared to be more resistant to the disease than check plants, but subsequent inoculations on descendants of these plants numerous well-developed primary and secondary tumors appeared, so that the resistance must be regarded either (a) as of a fugitive nature, or (b) as of a nature easily overcome by a more virulent strain of the parasite. That the strains used for these subsequent inoculations came from a more resistant strain may be assumed both because they were plated from a culture which appeared on one of the most resistant plants and because the same strain tried on a great number of plants produced primary tumors very numerous and showed an unusually strong tendency to develop secondary tumors.

The relation between the host and the parasite may be regarded as a case in which the parasite has the advantage.

If the bacterium is a soil organism and planters should aim to keep their plants free from it by refusing to plant infected stock.

Gardeners should plant on uninfected land and carefully avoid heeling out stock into soil which has previously received infected plants. Gardeners have been largely responsible for the dissemination of this disease.

The organism is a wound parasite. Its entrance is favored by careless weeding (Hedgcock) and by the presence of borers, nematodes, etc.

These galls occur on the roots of Legumes and have been mistaken for nitrogen root nodules.

The development of this disease is regarded as closely paralleling the development of cancer in men and animals.

There are no true metastases in crown gall, but this does not militate against the comparison, for whether a cancer shall be propagated by the growth of islands of tissue, or only by tumor-strands, appears to be a se-

condary matter depending on the character of the host tissues rather on the nature of the disease. The essential element is the internal stimulus to cell division.

186 - The Effect of Bordeaux Mixture on the Spores of *Spicaria farinosa* var. *verticilloides*, a Parasite of the Larvae of Vine Tineids.

FRON. Note sur l'influence des bouillies cupriques sur les spores des champignons du groupe des Isariées. — *Bulletin des Séances de la Société nationale d'Agriculture de France*, Vol. LXXII, No. 8, pp. 742-746. Paris, 1912.

It has been suggested that cupric mixtures, used as a remedy for the different diseases of the vine, hinder the propagation of the spores of the fungi parasitical on the insects which attack this plant.

The writer therefore undertook investigations as to whether the spores of *Spicaria farinosa* var. *verticilloides*, which seems to attack the larvae of the Tineids *Conchylis ambiguella* and *Polychrosis botrana* very rarely, are able to develop in contact with Bordeaux mixture, or after a shorter immersion in it.

The results of numerous experiments showed that the fungus resisted the prolonged action of Bordeaux mixture; they were not killed by a fifteen hours' immersion in a "5 per cent." mixture, and they germinated normally on the substratum in spite of the mixture being on the surface of the nutritive medium. These facts correspond to what is already observed in the case of other fungi.

It yet remains to be seen whether the infective power of the fungus grown under these conditions is modified as regards its host.

187. - "Iliu": a Disease of Sugar Cane in Hawaii.

LYON, H. L. Iliu, an Endemic Cane Disease. — *Report of Work of the Experiment Station of the Hawaiian Sugar Planters' Association, Pathological and Physiological Bulletin* No. 11, 32 pp., 10 figs., 1 plate. Honolulu, Hawaii, 1912.

The name "iliu" is a native term for a cane disease peculiar to Hawaii. The most conspicuous symptom is a binding of the leaf sheath into a tight unyielding jacket about the stem, which prevents the making any further growth.

The disease is produced by a fungus whose perfect form is known by the writer *Gnomonia iliua* n. sp.; the imperfect form, previously discovered, being known as *Melanconium iliua*. The *Gnomonia* fruiting body is of infrequent occurrence. The ascus spores are discharged into the air and disseminated by the wind, while the *Melanconium* spores are formed in the interior of the diseased shoots and are largely responsible for the local spread of the infection; they are not, however, with the disintegration of the shoot. This takes place comparatively short time, if the affected shoot becomes soaked with water. The *Melanconium* spores do not germinate readily in water, and are consequently well adapted to water dissemination. They retain vitality for long periods if protected from the sun, but are effectually destroyed if exposed for a short time to its direct rays.

It is a disease of young canes. The fungus gains entrance to the plant by entering the leaf bases, which join the stem below the surface of the soil; once inside the tissues, it causes the above-mentioned disease in the latter. Other things being equal, iliau causes a greater mortality among plant canes than it does among ratoons. Cane stools and cuttings which have been weakened by any cause are rendered more susceptible to the disease, which flourishes only during cool, damp weather. Demerara seedlings are the most resistant canes now being grown on a large scale, and consequently are good varieties to plant in fields where the disease is apt to flourish.

The most effective precautions that can be taken to minimize the danger of an iliau epidemic are thorough working of the soil and early sowings; these measures should be practised in addition to the ordinary measures usually taken to ensure a good stand of healthy cane.

PARASITIC AND OTHER INJURIOUS FLOWERING PLANTS.

Fourth International Congress of Rice Growers at Vercelli, Italy (1912): the Control of Weeds in the Rice-Field.

VERCELLI, N. II IV° Congresso risicolo internazionale. — *Il Giornale di Riscoltura*, Year 1912, No. 23, pp. 364-365. Vercelli, December 15, 1912.

Amongst the orders of the day passed at the Fourth International Congress of Rice Growers at Vercelli in 1912, were the following:

Subject III. — *The Control of Weeds in Rice-fields*, Part I. — *The Weeds which infest the Italian Rice-fields*. Report by Prof. G. Jacometti. The Congress considers, that it is necessary:

To continue the researches of Prof. Jacometti relating to breaking the life-cycle of the weeds which infest rice-fields, and that such researches should be carried on in all the rice-growing districts of Italy. To continue to weed carefully and regularly, not only at the usual time, but during the whole vegetative period of the rice.

To clean carefully all imported seed, both of rice and of other crops, in the rice-growing districts.

To invite the Government and the Agricultural Institutions to encourage rice-fields being kept clear by means of propaganda, competitions, prizes, etc."

Part 2. — *The Best Systems for the Control of Weeds in Rice-Fields*. Reported by Profs. V. Alpe and E. Ferrari. "The control of the weeds which invade rice-fields should be practised:

1) *Outside the rice-field*: by preventing the seeding of weeds growing in the meadows, among maize, or on the banks dividing the fields, which have escaped the scythe and the weeder, — not using the weeds as litter for animals, — using only such stable manure for rice-fields as has undergone prolonged fermentation.

"2) In the rice-field: by only sowing seed which has been free from weed seeds; by sowing and growing the rice for a short time, when it is possible, in dry soil; by regulating the water supply in such a manner as to hinder the development of the weeds without harming the rice; by turning the heaps of weeds, which have been collected during the weeding, at the right time to prevent their sprouting again."

"The Congress passed a vote that the above-mentioned problem should be made the subject of wide-spread propaganda on the part of the Agricultural Institutions of the rice-growing zones."

189 - The Blackberry-Bud Moth: a Promising Agent for Control

COCKAYNE, A. H. in *The Journal of the New Zealand Department of Agriculture*, No. 4, pp. 372-374. Wellington, October 15, 1912.

The Blackberry (*Rubus fruticosus* L.) was introduced into New Zealand as a cultivated plant; it then spread from place to place to such an extent that it has now become a very serious weed. Where cropland and temporary pastures form the basis of all farming operations, the blackberry is not a dangerous problem. But where the bush has been converted into permanent pastures the blackberry is decidedly pernicious, and from the cleared country it has extended to the areas of scrub and timber, but here it is in general restricted to the outskirts.

The blackberry is spread by seed which is conveyed by and eaten by chiefly birds. The individual plants by means of their arching branches which bend down to the ground and then root, soon form extensive impenetrable thickets.

The main methods of control that have hitherto been employed have been cutting and burning, followed, in the case of pastures, by mowing the young fresh growth down. In country which is rough and where stumps and logs are numerous, the use of goats has followed by excellent results. But these methods are necessarily expensive for large areas.

Up till quite recently the blackberry was singularly free from the attacks of any natural enemy that might be of value in its control. In a number of years past several parasitic fungi, notably orange-rust (*Gaeumannomyces*), have been noted as occurring sporadically, but in no cases have their effects justified the opinion that any of them would prove efficacious. During the past two years, however, a hitherto rare native moth, *Posina adrepiella*, belonging to the Tortrix group, has suddenly multiplied enormously, attacking the young shoots of the blackberry, and destroying them to such an extent that hopes are entertained that it will prove an exceedingly valuable agent in controlling the spread of the blackberry.

The eggs of the moth are laid in the leaf bases of the young shoots or in the bud itself. The larvae hatch very soon, penetrate the soft tissue and bore through the pith for a distance of perhaps 2 inches. This is followed by the complete death of the terminal shoot and consequently the spreading by means of pendent branches is eliminated. The plant

ed remain small in size and isolated, besides which they appear : their power of producing flowers and fruit to the same extent unaffected ones. Perhaps the insect attacks the flower buds also, is a point that has not yet been investigated.

INSECT PESTS.

Papers on Coccidae, or Scale Insects. The Genus *Florinia* in the United States.

POCCE, E. R. in U. S. Department of Agriculture, Bureau of Entomology, Technical Paper, No. 16, Part V, pp. 75-82, plates X-XIII. Washington, December 6, 1912.

The genus *Florinia* Targioni, at the present time consists of some described species and 4 varieties, and of this number there are only two species (*F. theae* Green and *F. florinae* Targioni) and one variety *florinae* var. *japonica* Kuwana), at present known in the United States.

The writer first gives a description of the genus and then describes three species of *Florinia* mentioned above, discussing their synonymy; geographical distribution, food plants and natural enemies.

The tea scale (*F. theae*) is recorded on camellias in Alabama, in the District of Columbia, Florida, Georgia, Louisiana, North Carolina and South Carolina. It has been collected also in Ceylon, the Philippine Islands and in various localities in India.

In the United States, this scale has only been found on camellias and tea, but in India it has been recorded also on olive (*Olea glandulosa*) and citrus; in the Philippines it occurs on a species of *Caryota*, in the Royal Botanic Gardens at Peradeniya, Ceylon, on *Ostodes*. Although *F. theae* seems to show a preference for tea at Sumner, South Carolina, it appears to be quite a serious pest on the camellias several of the more Southern States, and is not infrequently found associated with *Lepidosaphes lasianthi* Green.

This scale is controlled by *Chilocorus bivulnerus* Muls., *Microweisea laevis* Lec. and *Cybocephalus nigrifolius* Lec. On the tea at Darjeeling coccids are frequently covered by a parasitic fungus, which is doubtless a measure effective in holding this pest in check.

Florinia florinae has a wide range of distribution and is known to occur in the following countries: Algeria, Australia, Barbados, Brazil, China, Egypt, Europe (Belgium and Spain), Jamaica, Japan, Mauritius (?), Mauritius, Mexico, New South Wales, Peru, United States (California, Colorado, District of Columbia, Louisiana, Maryland and Massachusetts), Hawaiian Islands, West Africa and Zanzibar. The most important food plants of this scale are: *Anthurium acaule*, *Ulmus canariensis*, *Aralia*, *Areca aurea*, bamboo, bay, *Camellia*, *C. mauritiana*, *Chamaecrops humilis*, coconut palm, *Cupressus*, *Cycas* *revoluta*, *Dracaena indivisa*, ferns, *Ficus elastica*, *Ficus*

sp., *Garcinia* sp., *Hedera Helix*, Japanese Quince, *Kentia* Belm. K. *Forsteriana*, *Larix* sp., *Leptospermum*, *Licuala*, *Livistona*, *gratissima*, *Phoenix canariensis*, *Phoenix* sp., *Phormium tenax*, *Phas macrocarpa*, *Podocarpus*, *Streilixia Réginae*, tea (*Thea japonica*).

Amongst the natural enemies of *F. florinae* are recorded: a) *Aspidiotiphagus citrinus* Craw., found enclosed in the body of an a specimen of this scale in Washington, D. C., and on *Chamaerops humilis*; the same chalcid has also been reared from material on *Persea gratissima* from Honolulu, Hawaii; b) another species of *Aspidiotiphagus* reared from this scale on an undetermined plant collected at Hong Kong; c) *Prospaltella aurantii* How., collected from this coccid on *Ficus* at Swatow, Canton, China; d) *Sphaerostilbe coccophila*, the "red-leg fungus," observed in Mauritius on infested Camellias.

F. florinae var. *japonica*, although a native of Japan, has been introduced into the United States on numerous occasions on infested greens. In September of 1908 it was collected on *Tsuga* sp. at Que Pasa Long Island, and subsequently on Japanese hemlock at New York. In June 1909, it was observed on the fruit and leaves of *Podocarpus* received by the Bureau of Plant Industry from the Botanical Garden of New South Wales. It has also occurred on *Podocarpus chinensis* and *Pinus* sp. in California; on *Podocarpus Nageia* and *Abies Veitchii* in the Philippines; and on *Pinus pentaphylla*, *P. Thunbergii* and *T. Sieboldii* in Japan.

191 - Parasites of Apple Weevil observed in the Valle-di-Non (Trent, Austria).

CARONI, GIULIO. : Parassiti dell'*Anthonomus pomorum* (L.) osservati in Valle di Non (Trentino). — *Bollettino del Laboratorio di Zoologia Generale e Agraria della R. Università Superiore d'Agricoltura in Portici*, Vol. VI, pp. 148-150, figs. I-II. Portici, 1912.

Of 3000 apple blooms gathered in April 1911 in the Valle di Non (Trent, Austria), and each containing a larva of the weevil (*Anthonomus pomorum*), in 846 or 28.2 per cent. the weevil larva was attacked by parasite. Each of the diseased larvæ was placed in a glass tube, or a little bag of very fine gauze. The flowers containing healthy larvæ were covered with a bell-jar. At the time that the adult weevils appeared beneath the bell-jar, it was observed that from the 846 parasitized larvæ four Hymenoptera emerged, in the following numbers: 647 *Pimpla pomorum* Ratzb., 63 *Meteorus ictericus* (Nees), 29 *Habrocytus fasciatus* Thoms and 6 *Apanteles impurus*, with a noticeable preponderance females; 63 larvæ shrivelled up, and the remaining 38 were destroyed by a fungus determined as *Verticillium tubarum*.

Experiments in France in Acclimatizing some Species of *Glandina* which destroy other Gasteropods (1).

VILMORIN (de) PHILIPPE. Observations sur les Glandines à Verrières-le-Buisson. — *Procès-Verbaux des Séances de l'Académie des Sciences*, Vol. 155, No. 23, pp. 1289-1294 1 fig. Paris, December 2, 1912.

BOYER, JACQUES. Les Glandines, Mollusques carnassiers du Mexique. — *La Nature*, 1912, No. 2064, pp. 20-21 + 3 figs. Paris, December 14, 1912.

AVERONE, GASTON. Les Glandines ennemies des Limaces et des Escargots. — *Revue Viticulture*, Year 19, Vol. XXXVIII, No. 993, pp. 754-758 3 figs. Paris, December 26, 1912.

of, Bouvier has received from Mexico, and has distributed to some members of the Société Nationale d'Agriculture de France, several of carnivorous snails of the genus *Glandina*, which he proposes to acclimatize in France for the purpose of controlling the other gastropods which infest garden plants.

The 134 species of *Glandina* so far described, 53 are natives of the Americas, and principally of Cuba, Jamaica, Haiti and Porto Rico; 48 are from Central America; and 8 of Guatemala; most of the rest come from other countries in America, though a few species are indigenous to the countries bordering the Mediterranean. The European species do not possess the same American relatives, powerful labial palps, enabling them to live on a carnivorous diet.

In his observations of M. Philippe de Vilmorin were made on 25 specimens of *Glandina olivacea* Schum. (*G. guttata* Crosse and Fischer) which were kept in the open at Verrières-le-Buisson, near Paris, from November 1912. It appears that *G. olivacea* devours snails readily, but does not seem to eat slugs, at any rate those of the species *Arion*; it does not touch plants. It pairs and lays eggs in the spring. It remains to be seen whether these eggs hatch out and whether the adults are able to stand the winter temperature. At -4°C . the specimens died, while others went into a torpid condition.

Lavergne gives a description of the species of *Glandina*, with their geographical distribution and a list of 51 Mexican species; he mentions previous acclimatization experiments in France and the recent experiments of Prof. Bouvier and Prof. Berthier, and refers to various observations made in France and Mexico on the habits of *Glandina*.

The Caterpillar Pest of the Mokameh "Tal" Lands (2).

BOURDICE, E. J. and FLETCHER, T. BAINBRIDGE in *The Agricultural Journal of India*, Vol. VII, Part IV, pp. 343-354 + 2 maps and 1 fig. Calcutta-London, 1912.

For the last fifteen years or so the winter crops on about ten thousand acres of "Tal" land near Mokameh, on the southern bank of the Ganges, have been destroyed annually by *Agrotis ypsilon* caterpillars. The lands are flooded during the rains (June to September) to a depth

See also No. 1369, B. Sept. 1912.
See No. 83, B. Jan. 1913.

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of 5 to 15 ft., and are ploughed and sown as soon as the water is there; the moths are apparently attracted to the wet mud, and lay their eggs there; the larvae attack the crops as soon as these spring up, rapidly increasing in numbers until the whole crop is totally destroyed. The crops chiefly sown are «masur» (lentil) and «khesari» (*Lathyrus sativus*), with peas on the higher lands. This damage was reported in 1909, but the losses had then already increased to such an extent that no remedial measures were of avail. In 1910 trials were made of handpicking, which was found to be efficient if properly organised. In this year practically a normal amount of damage was done. In 1911 systematic handpicking of the caterpillars was adopted as soon as they appeared, and over sixty thousand early caterpillars were thus destroyed before the middle of November. Trial was also made of the moth-traps produced by Messrs. Andres Maire et Cie., Alexandria, and containing «Prodenine», an attractive liquid specially produced to destroy the moths of *Prodenia litura* (*littoralis*), whose caterpillars are injurious to cotton in Egypt. Over two thousand female *Agrotis* moths were caught in one trap during November. As a result of these measures it is estimated that over six thousand acres of crops were saved. Further and extended trials of these traps and of hand picking will be made.

194 - Notes on Insects injurious to Cotton in South Africa.

MOORE, W. In *The Agricultural Journal of the Union of South Africa*, Vol. IV, No. 714-720, 1 plate. Pretoria, November 1912.

Of late years, the cotton crops of South Africa have been much injured by insects; in some cases the loss has been as high as 75 per cent or more.

From his recent observations, the writer describes the species most injurious to the cotton plant and the methods of control which are at present in use.

The most important pests are a) the spiny cotton-boll worm (*Insulana*), known in the Sudan as the "Egyptian cotton-boll worm" and in India as the "spotted cotton-boll worm" (1); b) the cotton-boll worm (*Heliothis armiger*), which often attacks peas, and is known as the "pea worm," but also injures roses, carnations, the young fruit of peaches, apricots, apples, plums, nectarines, tomatoes (tomato-worm), tobacco (tobacco-worm), maize (mealie-cob borer, the mealie-stalk borer); c) the cotton stainer (*Dysdercus nigrofasciatus*); d) the dusky cotton bug (*Oxycarenus laetis*); e) the cotton aphid (*Pulvinaria jacksoni*); f) the cotton aphid (*Aphis gossypii*).

Besides the above-named insects, which are the most serious pests so far noticed in South Africa, the cotton leaf roller (*Sylepta gata*) (3) should be mentioned, also a species of leaf bug of the Capsidae, the green stink bug (*Nezara viridula*) and the black stink bug (*Atelocera stictica*).

(1) See No. 3048, B. Aug.-Sept.-Oct. 1911.

(2) See No. 1975, B. June 1911.

(3) See also No. 656, B. April 1912.

***Conorrhynchus luigionii* and *Lixus junci* destructive of Sugar Beets in Campania, Italy.**

pest, ROMOLO. Alcune notizie intorno a due Cleonini, *Conorrhynchus Luigionii* Solari e *Lixus junci* Boh. (Coleoptera-Curculionidae), dannosi alla barbabietola da zucchero in Campania. — *Bollettino del Laboratorio di Zoologia Generale e Agraria della R. Scuola Superiore d'Agricoltura in Portici*, Vol. VI, pp. 26-42, plate I. Portici, 1912.

The damage done to sugar beets in Italy by *Conorrhynchus luigionii* Solari was observed for the first time during the spring of 1906 in some fields in Campania, whence in the space of a year this beetle spread throughout the neighbourhood. *Conorrhynchus luigionii*, in the adult state, devours with surprising voracity the leaves even of the young plants and in the larval form it destroys the pulp of the root.

Lixus junci Boh. appeared contemporaneously with the above mentioned pest in the sugar beet fields of the same district, and spread there very rapidly. This is due partly to the fact that it is able to fly and partly to its practice of attacking garden plants besides sugar beets. The chief damage is caused by this beetle when the beets begin to germinate, since the females deposit their eggs at this time in holes, which they excavate with their rostra in the stalks of the plants. Nearly all the beets thus attacked die, being actually cut in two. Other eggs are laid along the edges of the leaves when the plants have developed well. The larvae, as soon as they hatch out, excavate long galleries in the roots, gnawing away a good deal of the pulp.

As a means of controlling both these beetles, the writer especially recommends seeking out the adults in their hiding-places: under stones and in crevices of the soil and under leaves, thus entirely freeing the fields from these pests. As a supplementary measure only, the leaves of sugar beets may be treated with insecticides (different solutions of arsenic salts; with a 4 or 5 % barium chloride solution; arsenite of sodium solution 5 % with the addition of 10 lbs. of flour to every 100 gallons of solution to make it stick; carbon disulphide; arsenate of lead from 1 to 2 %; copper arseno-acetate at 0.15 %).

Insect Parasites of *Atriplex hortensis*.

JOEL, PAUL. Les ennemis de l'Arroche. — *Bulletin du Laboratoire régional d'Entomologie Agricole*, First Quarter 1913 (Jan.-March), pp. 6-8. Rouen, 1913.

The writer enumerates the numerous insect parasites of this kitchen-garden plant.

Coleoptera: *Mecaspis fasciatus* Müller, *Cassida margaritacea* Fb., *nebulosa* L.

Hemiptera: *Aphis papaveris* Fb., *A. atriplicis* Fb., another undetermined species of *Aphis*, two undetermined Psyllids, *Trioxa atriplicis* Stål.

Lepidoptera: *Arctia caja* L., *Hadena aleracea* L., *Agrotis ianthina* L., *A. fimbria* Hb., *A. sigma* Hb., *A. plecta* Hb., *A. putris* L., *A. ripae* L., *Caradrina superstes* Tr., *Myciophorus punicea* Gxl., *Mamestra persecta* Hb., *M. chenopodii* Hb., *M. suasa* Hb., *Hadena atriplicis* Hb.,

Hydroecia micacea Esp., *Calocampa exoleta* L., *Brotolomia meticulosa* L., *Eupithecia subnotata* Hb., *Cidaria chenopodiata* S. V., *Gelechia nana* Dup., *G. atriplicella* F. R., *G. obsoletella* F. R., *G. hermannella* Fb., *G. dines roesella*, *Coleophora unipunctella* Zell., *C. binotatella* Zell., *C. ginella* Ill., *C. annulatella* Tenst., *Butalis chenopodiella* Hb., *Spontophora hornigii* Led., *Goniodoma auroguttella* F. R., *Pterophorus rodactylus* L., *Coleophorus stephani* Joannis and one undetermined one.

Diptera: *Pegomya hyoscyami* Macq., *Asphondylia conglomata* Stefani, *A. punica* Marchal, five undetermined Cecidomyids, *Stephanotrachinae* Stefani, *S. atriplicis* Kieff., *S. brevipalpis* Kieff.

Acari: *Eriophyes heinii* Nal., *E. brevipes* Nal., and one undetermined species of *Eriophyes*.

197 - Enemies of the Spinach.

NOEL, PAUL: Les ennemis des Epinards. — *Bulletin du Laboratoire régional d'Entomologie agricole*, First Quarter 1913 (Jan.-March), pp. 13-14. Rouen, 1913.

A list of the parasites of this kitchen-garden plant:

Lepidoptera: *Arctia villica* Hb., *Amphipyra tragopogonis* L., *G. dines roesella* L.

Nematoda: *Heterodera schachtii* Schmidt, *H. radicicola* Greef.

Fungi: *Peronospora effusa* Grev. (1).

198 - The Elegant Grasshopper.

The Agricultural Journal of the Union of South Africa, Vol. IV, No. 5, pp. 753-755, toria, November 1912.

Zonocerus elegans, the Elegant Grasshopper, known to many far as the "stinksprinkhaan," causes much damage every year in many parts of South Africa. In 1911, it was unusually abundant in parts of Cape Province and of the Transvaal.

The insect is especially troublesome in gardens and orchards is particularly fond of fruit and will attack almost any kind of vegetable even including onions.

As the elegant grasshopper does not move in swarms, nor migrate far, its control is a local matter and its presence is little regarded by Central Government.

Many insecticides have been used for its destruction, but the results have not always been satisfactory, owing to the dangers to plants and cattle which are incurred by their employment.

The most practicable way so far known of dealing with the insect in gardens, appears to be the collection of the young grasshoppers in butterfly-nets but of stouter material), or in an improvised bag. The insects should then be turned into a vessel containing a small quantity of paraffin floating on water. Thousands may be caught and killed in a few minutes in this manner.

(1) See No. 579, *B. March* 1912 and No. 70, *B. Jan.* 1913.

The Green Oak Tortrix in Italy.

RICCONI, GIACOMO. La Tortrice delle querce in Italia (*Tortrix viridana* L.) *Bollettino del Laboratorio di Zoologia Generale e Agraria della R. Scuola Superiore d'Agricoltura Portici*, Vol. VI, pp. 308-319, figs. 1-6. Portici, 1912.

In 1911 for the first time a slow and continually increasing destruction of the oak leaves due to the attacks of the larvae of the Green Oak Tortrix (*Tortrix viridana* L.) was observed in the oak woods of some districts of Venetia, Romagna, Tuscany and the Marches. In 1912, the attack repeated and with still more serious results.

This insect, which is widely spread in Central and South Europe, Finland, Sweden and Norway and in Asia Minor, had hitherto only been observed in North and Central Italy; but according to the data collected by the writer, it is equally common in the South.

Fig. Ceconi gives a systematic description of the species, followed by biological notes. The moth appears in Italy from the 20th of May to the 20th of June. The female lays its eggs around the buds, in their vicinity; the eggs survive the winter and only hatch out in spring, when the larvae begin to devour the leaf and floral buds, and attack the young foliage, of which they only leave the veins, fastening together with silky threads. When the larvae are full-grown, they devour the other leaves, only sparing a fragment here and there attached to the principal nerves. The leaves, or rather leaf-fragments, are rolled together and rolled, thus forming a shelter for the caterpillar during its moult. When about a month old, the caterpillar pupates in this envelope.

The trees of an entire forest may be completely defoliated by these caterpillars, which sometimes devour even the axes of the catkins, which include also the peduncle and base of the young acorns. This causes the death of the tree, at least a hindrance in its development and in that of the wood, and brings about the loss of the fruit.

The measures of natural control which are most recommended are the protection of the insectivorous birds found in oak-woods (tits, warblers, finches, etc.) together with the protection and diffusion of the natural parasites of the pest. In 1911, the writer succeeded in breeding various Hymenoptera (seven Ichneumonids, one Braconid, two Chalcids, and three Diptera). The writer comes to the conclusion, from his examination of the material received in 1912, and from comparing the results of his year's breeding with those of 1911, that at present the Ichneumonids (and especially *Pimpla maculator* F.), which are the commonest parasites, are only found in Venetia. In Tuscany, on the other hand, there are Braconids and Chalcids, as well as some Diptera. No parasites were obtained from the material from the Marches, which however does not prove their absence in this district. If the Ichneumonids were numerous in the forests of Venetia, they, as well as the Braconids, Chalcids and Diptera, might with advantage be transported to other districts. Artificial remedies have so far proved practically useless.

200 - *Rhabdophaga saliciperda* damaging Willows in Italy.

CECCONI, GIACOMO. La Rabbolaga distruttrice dei salici in Italia (*Rhabdophaga saliciperda* Duf.). — *Bollettino del Laboratorio di Zoologia Generale e A. varia della R. Università di Portici*, Vol. VI, pp. 320-330, figs. 1-3, plate II. Portici, 1912.

The Willow-wood Midge (*Rhabdophaga saliciperda*) was discovered in 1841 in France, Austria and Germany. The writer was the first to record its occurrence in Italy—in the Province of Florence, in 1910, on *Salix alba* L. Outside Italy, this midge attacks other species of willows and also *Populus alba* L.. It is injurious only in its larval condition when it tunnels into the wood of young trunks and branches. At first the cortex of these portions remains intact and of the same colour as the unaffected parts, while the exterior has an irregularly undulating, mottled appearance. Gradually the colour of the cortex changes, becoming a reddish-brown, and slight longitudinal cracks appear. The cortex continues splitting longitudinally, and when the time for swelling comes, it appears completely perforated, becoming continually darker; then it dries up and gradually becomes detached, and the fragments fall to the ground. Thus the cavities made by the larvae are exposed to view, and the wood assumes a blackish colour.

In the meantime, the tree has begun to react, forming a cicatrix all round the zone occupied by the cavities of the larvae. As, however, the females prefer laying their eggs around the injured zone, the destruction continues in the second, the third, and even the fourth year, provided the trunk and branches are of a sufficient size. In this case the affected zone extends in length and width, so as to almost completely encircle the trunk, or branch, which then breaks off at this point. The upper portion of the larva-infested zone withers very soon, so that the thin stems and the branches break off directly after the first or second year's attack.

So far, no parasites of *Rhabdophaga saliciperda* had been mentioned, but the writer, in three years' consecutive breeding, obtained five species belonging to the Hymenoptera (*Platygaster* sp., *Eutelus* sp., *Tridymus* sp., *Torymus tipulariarum* Zett. and *Eurytoma* sp.), which will be described in another work.

As a remedy against the midge, it has been recommended to cut the infected parts of the tree with a viscous substance, so as to prevent the exit of the pupæ and the adult insects. The infected parts may be cut off and burnt.

According to the writer, use can be made of the five above-mentioned parasites and especially of *Torymus tipulariarum*, which increased much from 1910 to 1912, that it alone destroyed 60 per cent. of the larvae of the midge in some trunks and branches.

An Insect Pest of the "Currajong" (*Brachychiton*).

ESCH, C. Junr. in *The Journal of the Department of Agriculture of Victoria, Australia*, X, Part 11, p. 662, 1 plate. Melbourne, November 1912.

The "Currajong" (*Brachychiton populneum* R. Brown = *Sterculia peltata* G. Don), is much cultivated in Victoria (Australia) as an ornamental tree in large private gardens, public parks and avenues. In times of drought, in some parts of the interior of Australia, the stock have been saved by eating the leaves of these trees and the roots, if they happened to be exposed.

Psyllid, *Tyora sterculiæ* Froggatt, attacks the leaves of the "Currajong," which causes them to become discoloured and spoils the appearance of the trees themselves. The parasite was first discovered at Sydney, New South Wales.

The most effective means of dealing with this pest is to spray the trees with kerosene, or benzol emulsion, pine oil spray, or any other material which kills insects by contact.

